

The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XVI: No. 4.

New York, Thursday, July 22, 1875.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Progress of the Hot Blast.

The application of a heated blast to the production of iron in the blast furnace has generally, and to a certain extent correctly, been attributed to Jas. Beaumont Neilson, manager of the gas works at Glasgow, who, in 1828, patented what he entitled an "improved application of air to produce heat in fires, forges, and furnaces where bellows or other blowing apparatus are required." The principle of this invention, and indeed of all the iron hot blasts which have followed it, was to pass the blast intended for heating iron or reducing ore through an iron chamber heated considerably above the ordinary temperature of the blast. This chamber was only to be heated to redness, but produced such a wonderful economy of fuel at even a lower temperature, that attention was at once drawn to heating the blast in the best and most economical manner. It was not, however, until 1833, and some four years after Neilson's patent was granted, and also after several failures, that the use of hot blast was introduced. It is unnecessary here to describe in detail the construction of Neilson's earlier hot blast apparatus. Wrought iron pipes were first tried and found to corrode too quickly, and finally the first successful arrangement was that of horizontal cast iron pipes 18 inches diameter and united by flanges; these presented a heating surface of only 340 square feet, but in it he is said to have raised the temperature of the blast to 600°, or sufficient at least to melt lead.

Difficulties from contraction and expansion here arose and terminated the use of this system, which was supplemented by Neilson with a "cast iron tubular oven," consisting of cast iron cylindrical parallel mains, horizontally placed and connected by a series of smaller arched pipes, the ends of which were fitted into the mains. The fire was made between these in a grate, and the whole inclosed in a semi-circular arch of brick connecting with a flue. Upon this all the modern plans of iron hot blast apparatus are simply improvements. Neilson's original idea of heating the blast by a separate fire soon, however, gave way to the use of the waste gases from the tunnel head of the blast furnace itself. This innovation was the subject of continuous and acrimonious discussion at the time of its introduction, and to this day has its opponents among a certain few. The consumption of waste gases has, however, become almost universal in the modern blast furnace plant, and is applied to the generation of steam, and the roasting of ores, as well as to that of heating the blast. Indeed, at some points on the Continent these gases are used in charring wood, the production of pyroligneous acid, etc., etc.

The progress of the iron hot blast apparatus, both in Europe and the United States, has been simply a continuance in the track laid out by Neilson, viz., in the construction of pipe ovens of different forms and arrangements in which the blast is passed over the heated inner surface of cast iron pipes, the source of heat being the combustion of gas in a chamber or species of furnace in which the pipes are placed. The principal improvement in this system is due to John Player, which overcame the previous difficulty in entirely consuming the gases around the pipes without destroying the pipes themselves entirely. Player's stove consisted of a combination of a fire brick chamber with openings in the top of the arch in which the furnace gases are burned with an admixture of atmospheric air. Through the openings in this arch the flames ascend into a chamber containing the cast iron pipes through which the air to be heated passes, and which are maintained at a red heat. The pipes are arranged in the figure of a siphon, and in the ordinary Player stove contain about 1000 square feet of heating surface, or sufficient to heat 2300 cubic feet of air per minute to 1200° Fahr. The advantages of the Player stove were a longer life to the pipes and maintenance of a greater uniformity of temperature. They have been and are still in general use in this country to a great extent, and have not probably been materially improved upon by any form of pipe stove since invented, and of which there have been several. The primary objections to pipe stoves, and they may be considered also final objections, are, that the blast cannot in practice be raised to more than 800° to 900° Fahr., and that at this temperature pipes soon burn out, expansion and contraction will open joints, causing an appreciable loss of blast, and necessitating an increased consumption of gas or fuel; and, moreover, stoppages for repairs, rebuilding and cleaning out are so numerous and frequent as to make a very large item in the allowance in cost for "contingencies," and to frequently materially add to the cost of iron produced. Until within comparatively few years abroad, and, in practice, in this country until the present summer, such has been the situation of the hot blast system, and its advantages theoretically have been in practice greatly diminished by the difficulties arising from destruction of pipes, repairs to ovens, cleaning, explosions and kindred disasters.

Previous, however, to Neilson's invention, in 1838, the principle upon which the greater portion of our metallurgical industry is destined to be conducted was laid down by Robert Stirling, who, in 1817, patented a system of heating airs, gases, or fluids by the agency of airs, gases or fluids, by means of passages formed of brick, metal, stone, or any suitable material readapted to the degree of heat required. This was the foundation of the regenerative principle, and the basis on which all systems of fire brick stoves for heating are placed. But Stirling simply demonstrated the application of his system to the manufac-

arrangement of bricks or lumps in the regenerators afforded space for the deposit of this dust, which speedily stopped up the open work and impeded the currents. This necessitated the use of a purifier, in the arrangement and construction of which great expense has been incurred, and which still required frequent stoppage for cleaning, whereby loss was incurred. No method of cleaning this out from the outside is supplied, and an additional fault is that the gas is not forced to pass over the whole heating surface. To overcome the obstacles presented in the Siemens-Cowper system, and yet to utilize the excellent principle

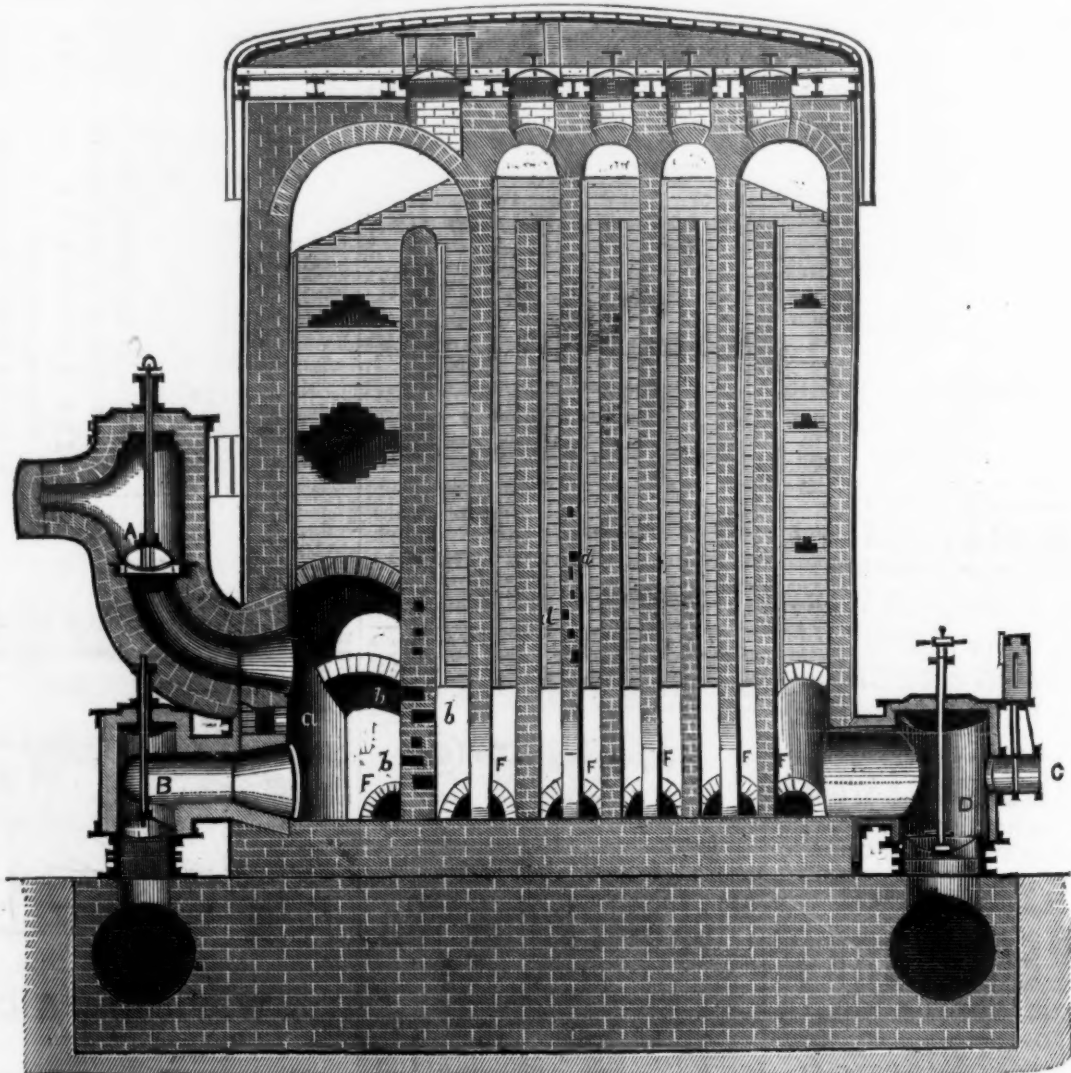
substituted solid brickwork, the first stoves which were erected at the Thornaby Iron Works being rectangular, which form was speedily altered to circular. The formation of the stoves are extremely simple, and they are worked in pairs, one being heated by the gas while the other is heating the blast, and *vice versa*. The stove is then simply of a circular, upright form, in largest size 28 feet high and 22 feet diameter, surrounded by an air-tight shell of boiler plate, divided interiorly by nine parallel walls so placed that the gas is burnt where it enters, and the whole of the products of combustion are led over one wall and under the rest until they

As economy is of the first importance, the results obtained by these stoves are noted. When first introduced at Consett Works, England, the weekly product was 350 tons iron, with a consumption of 24½ cwt. of coke to the ton, with a 44 per cent. ore. The use of the Whitwell stove increased this yield to 500 tons iron per week, with a reduction in the fuel to 20 cwt. per ton of iron. This result was so clearly a step of important progress in the practice of hot blasts that the stoves were speedily adopted in England, Wales and very generally on the Continent, where something over 200 of them are now in use. The average product with one stove is 100 tons pig per week, the average temperature being 1400° by the electrical pyrometer, and the following data are interesting, as supplied from results in actual working, viz.: Diameter, 22 feet; height, 28 feet; quantity of air heated per minute from the temperature of 60° Fahr., and ordinary pressure of atmosphere, 1200 cubic feet; temperature to which above air was raised, 1430° Fahr.; volume of above air when heated as above, 4387 cubic feet; speed of blast through oven per minute, 328 feet; total heating surface in each oven, 9000 superficial feet; product of iron (four stoves) 44 per cent. ore, 500 tons per week; coke per ton of iron produced, 17 cwt.; charcoal per ton of iron, 32 per cent. ore, 20 cwt.

The distinguishing advantages claimed for these stoves are: 1. Ability to stand 2000° heat without damage. 2. No cast iron pipes to wear out. 3. Facility of cleaning while hot. 4. Economy of gas and fuel and utilization of entire heat given off by such gas or fuel. 5. No greater cost, in proportion to result obtained, than ordinary cast iron plant. 6. An economy of several cwt. of fuel to ton of iron. 7. No leakage, and hence less wear and tear on blowing engines. 8. No loss by friction—a pressure of four pounds at the engine house giving an equal pressure at the tuyere. 9. Regularity of temperature, producing the best effect in working the furnace.

In the United States the Whitwell fire brick stove has been adopted by the Cedar Point Iron Co., Lake Champlain, N. Y.; Etna Iron Co., Ironton, Ohio; Meier Iron Co., Missouri; Rising Fawn Iron Co., Dade county, Ga.; and others now in construction. The Rising Fawn Furnace has been first to blow in with this stove in the United States, although the Cedar Point Furnace is completed and the others nearly so. The results obtained at Rising Fawn Furnace from American ores and in an American plant are useful as data for subsequent production. The furnace is 16x60 feet, 12 feet throat, 6 feet 6 inches hearth, and with boshes of an angle of 73°. There are three Whitwell stoves, 30 feet high, 18 feet diameter with 8000 superficial feet of heating surface in each. The ores are fossiliferous and represent about 44 per cent. iron; the fuel, coke from the Great Warrior coal made in Belgian ovens. The furnace was lighted June 16th, on the 18th blast was put on, and on evening of same day the stoves were working, increasing temperature at tuyeres from 150° to 300° Fahr. Two hours later 450°, and at 11 p. m., or in 5 hours, to 600°, melting lead at the tuyeres. On 4 p. m. on the 19th, 27 hours after blast, 15 tons of white iron were cast. On the 21st the furnace made 1 cast of mottled, 2 of gray forge and No. 2 X. The iron is strong with little tendency to cold-shortness. At the time the engineer in charge of the stoves, Mr. Wm. M. Brown, who is Mr. Whitwell's American representative, and to whom we are indebted for these notes, left the works, the furnace was making iron on 2400 coke to 4600 ore. No limestone or other flux being used, owing to lime in ore and slate in coke, the charge was as follows: One part of ore representing 44 per cent. iron, 13 per cent. lime, 3 per cent. alumina, and 10 per cent. silica, so that in 40,000 lbs. of ore were 20,340 lbs. iron, 5080 lbs. lime, 4000 lbs. alumina and 1380 lbs. silica. The fuel charge was represented by 17,880 lbs. carbon or perfect coke, 3048 lbs. silica, 1690 lbs. alumina and 480 lbs. lime, which gives for the furnace charge: 20,340 lbs. iron; 17,880 lbs. coke, perfect; 7648 lbs. silica; 6460 lbs. lime; 3060 lbs. alumina. This would give 17.17 cwt. of coke, perfect, to the ton of iron, or 18.03 cwt. of Connellsville coke to the ton. These results are sufficiently striking to speak for themselves, and to bear out the general statement of the patentee that with these stoves one ton of fuel will make one ton of iron. The results with anthracite will be looked forward to with interest as well as with confidence in their success.

Vacuum Relief Valve for Water Pipes. Philip Hinkle, San Francisco, Cal., has invented a novel relief valve for water pipes, by which he is enabled to prevent the heavy jar caused by the sudden shutting off of running water in pipes, where a vacuum is produced by its running. The invention consists of an inwardly opening valve, suitably attached, which is kept closed by a light spring and the pressure of water inside the pipe. When this latter pressure is removed by the vacuum caused by the flow of water, the pressure of air outside of the valve will open it and allow air to enter and relieve any jar.



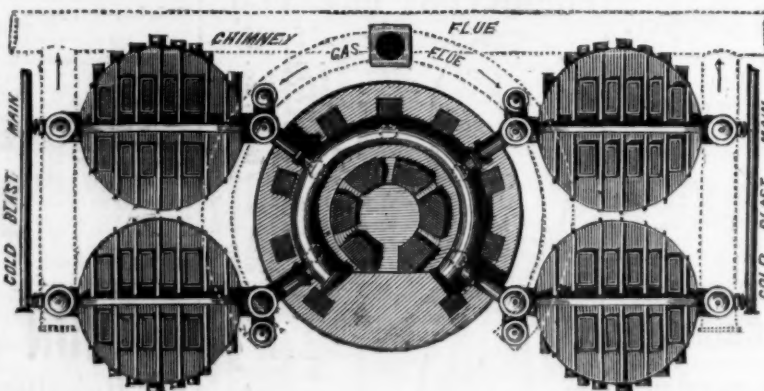
THE WHITWELL HOT BLAST STOVE—VERTICAL SECTION.

ture of glass and pottery. This principle lay dormant until 1856, when Siemens patented the great improvement in furnaces which bears his name. Here is passed through chambers containing refractory materials, generally fire brick loosely stacked, and air to support combustion in the furnace is passed through the same chamber in the same or opposite directions, alternately, so as to become heated. Two such chambers are used, flame passing through one and air through the other. This principle, now in such general use in steel works and glass works, and which alone enables the production of open hearth steel, or Siemens-Martin steel, was applied to the heating of the furnace blast in 1856, by Edward Alfred Cowper, of England, and may be considered the first practical application of the regenerative principle to furnace blast. In Cowper's stove, the air under pressure is heated by passage through regenerators consisting of air-tight iron cases lined with fire brick. A series of intricate passages are made for the air, and another series contiguous pass the products of combustion. These regenerators are filled with fire clay in lumps, and the peculiarity consists in inclosing the regenerator in an air-tight case. These stoves were a great advance on pipe stoves, since they allowed of almost the whole heat discharged by the gaseous fuel being utilized by the blast, and carried the temperature to 1200° to 1300° F. Moreover, all leakage was avoided, and the entire force of the blast was obtained at the tuyere. But the Cowper stove failed to recognize the difficulty to be encountered in the dust with which all blast furnace gas is laden. The

embodied in it, was the problem of the hot blast at this time. This was successfully solved by Thomas Whitwell, of Stockton-on-Tees, England, for many years a practical iron master, and who visited the United States during the fall and winter of 1874, and was, in company with Isaac Lowthian Bell, the honored guest

enter the chimney flue, being then little above 212° Fahr. After a few hours heating the currents are reversed, and the blast takes up the heat received from the products of combustion, and passes into the tuyere at a bright red heat. As the direction of the blast is inverse to that of the gas, the cool air enters the stove at its

coolest part, viz., where the burnt gas cooled down to 200° to 300° Fahr. has just left, and leaves the stove, being gradually more and more heated, at a temperature of 1400° Fahr. and upward, as indicated by Siemens' electric pyrometer, giving the whole of the heat eliminated from the burning gas, and maintaining a uniform temperature of blast. The whole of the interior of the stove is visible by means of eye pieces, and the operation may be inspected at any time. The various valves for the gas and hot blast are cooled by water, so that they are faced air-tight, and have been in some cases safely exposed to a temperature of 3000° Fahr., and where in use for nine years, as at the Consett Iron Works, England, no one of 64 valves has failed. The cleaning of the stove is extremely simple, being done while red-hot, and only causing a delay of the stove being cleaned for an hour; but no stoppage to the furnace. This cleaning is required only five or six times per annum. The durability of these stoves is their great feature next to their economy of fuel. The first stoves erected, some nine years, since have never been stopped for repairs, and after careful calculation the constructor considers them certain to run ten years without repair, and that not to exceed \$500, after which they will be good for ten years more.



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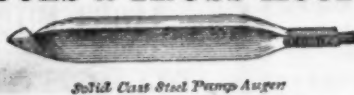
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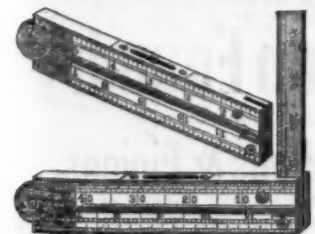
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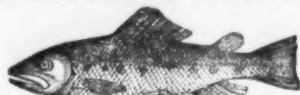
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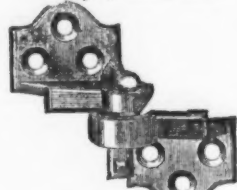
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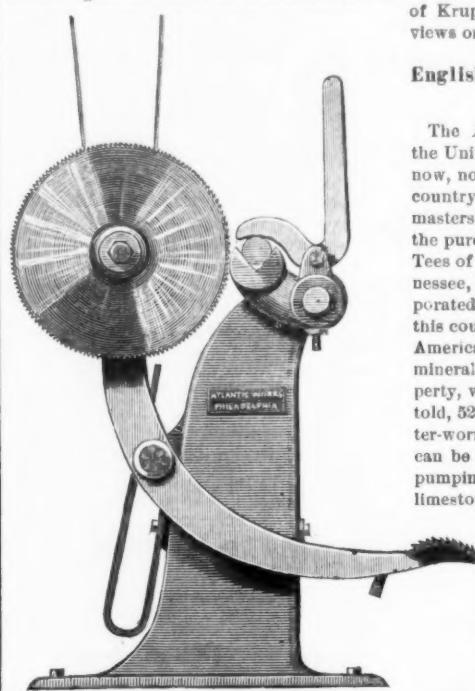
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Cutting off Saw for Hot Iron.

We give below an engraving of a neat, compact machine for cutting off iron, constructed by Richards, London, and Kelley, engineers, Philadelphia. The employment of circular saws for cutting off hot iron bars is now a plan so common that we need scarcely refer to the process. The machine shown has one claim which is of considerable importance; there are no sliding surfaces, and no chance of derangement from iron scale or iron dust. The saw spindle is mounted in a pivoted frame, and as there is no friction or other resistance than the cutting action, an operator will feel the operation of the saw as it is pressed against the iron, a matter of some importance, and necessary to protect the saws from injury, which often occurs when the feed is not sensibly felt. A number of the supporting brackets are fitted on a rod, three to four feet long, so arranged as to be set up in the position shown, or dropped down out of the way, as the length of the iron being cut may require. Adjustable gauges for determining the length of the pieces cut are provided on the opposite side of the machine from the one shown in the engraving. The belt coming down from a shaft above becomes slightly tightened as the saw is pressed forward to the iron, and loosened again when the saw returns to the position shown. The purpose of this arrangement is to avoid unnecessary strain



upon the saw spindle when the machine is not in use, and to permit it to run continuously, a matter of convenience when a number of workmen use the same machine, as it saves stopping and starting each time a piece is to be cut.

The World's War Machinery.

The uppermost idea in the European mind just now would seem to be the improvement of the engineering of war to a point which will embrace all the latest scientific suggestions, and make the business of human slaughter one of the fine arts, if it is not that already. We are not sure that the same idea is not also at work to some extent in the average American mind, else we should scarcely witness so much popular enthusiasm over the achievements of our New York riflemen in Ireland. One would suppose, from the recent excitement on both sides of the Atlantic, that the most urgent wants of the time were rifles, projectiles that will carry farther than ever before, guns of heavier caliber, with men to handle them who must be, in their way, trained scientists. The relative merits of Creedmoor, Wimbledon and Dollymount are coming to be discussed with as much popular earnestness as the wonderful performances of the Prussian needle gun used to excite after the battle of Sadowa. What all this portends in the future we do not propose to discuss; but the thought may be deserving the serious consideration of the Peace Society.

The British House of Commons, at last dates, as if catching the spirit of the times, were discussing the expediency of reorganizing their gunnery system, with a view of placing it on the same footing with the most advanced nations of the Continent. The discussion, as might be expected, disclosed a wide diversity of opinion on the subject; for, while some members maintained that their great guns for navy and fortification purposes were superior to those of every foreign power, whether muzzle or breech-loading, in durability, rapidity, power, simplicity and cheapness, others were prepared to demonstrate that the Germans, and even the French, were ahead of them in these several respects. Still another school, while admitting the necessity of maintaining the ordnance department at the highest state of efficiency, including "all the modern improvements," were opposed to making any new experiments just at this time on the score of economy. To carry out the views of those who thought the existing system was getting behind the times would cost some five or six millions, and the government was not prepared for any such outlay. The national defenses to-day were impregnable, and the new improvements could afford to wait. It is to be observed, however, that the gentlemen who argued in this way were civilians, while the anti-economists, for the most part, were persons who had had the advantages (or disadvantages) of a military education, and know from practical experience something about guns and gunnery. A Colonel Price, for instance, entered into an elaborate condemnation of the Woolwich system of rifling. The condition of their heavy ordnance, he contended,

was such as to demand the serious consideration of the government; and he moved, therefore, for a select committee to inquire into the best means for supplying the navy with more efficient guns. Another colonel, Colonel Reed, also disapproved the Woolwich gun on every ground, and urged on the government the duty of replacing it by a superior system, and especially he advocated the introduction of breech-loaders. It was the Ordnance Select Committee which led them into that mistake. Directly it set up for an inventing, and not an advising committee, it began to go wrong. The select committee proposed by Colonel Price he thought would be of great service. Major Beaumont proclaimed himself an advocate of the breech-loading system, though he thought the controversy would never be settled by mere theory. In his judgment, the wisest course would be to appeal to the inventive genius of the country to produce a breech-loader equal in penetration to the muzzle-loader. The motion for a select committee was finally withdrawn, but the temper of the House was clearly such as to warrant the expectation that the subject will not be permitted to sleep. The fact is, "guns" now-a-days are so essential a part of the machinery of government that it would be surprising if they did not command periodically as much attention in Parliament as at Wimbledon, Creedmoor or Dollymount, or at Kaiser Wilhelm's inspection of Krupp's latest, or at MacMahon's grand reviews on the Champs de Mars.

English Investments in American Mineral Lands.

The *Engineer* says: The mineral wealth of the United States has a great attraction just now, not only to the operative miners of this country, but likewise to certain of our iron masters. The most recent indication of this is the purchase by capitalists in Stockton-upon-Tees of an extensive tract of country in Tennessee, and the forming of a company, incorporated under the Companies Acts, 1862-67, in this country, and also under charter from that American State. The object is to work the minerals, and to make pig iron upon the property, which, among other contents, has, we are told, 52,000 acres of coal outcropping into water-worn ravines in seams 12 feet thick, which can be mined by drift-ways, without shafts or pumping. Near at hand there is mountain limestone 200 feet thick; brown hematite and specular iron ores, free from sulphur and low in phosphorus, are found in seams varying from 80 feet to 240 feet in thickness over several miles of country; and, lest these should not be enough, there are also manganese ore, lead ore, and sulphate of baryta. We have not heard that either gold or diamonds exist in the property.

Analyses made at Port Clarence, at Newcastle, and at the Royal School of Mines, together show that the manganese ore contains 82.43 per cent. of oxide of manganese, that the coking coal contains from 68 to 69 per cent. of coke, and the steam coal 75 to 82 per cent. of carbon. The property is intersected by canal and rail, and a navigable river connects deep water frontages of the estates with the Mississippi. We have called attention to only that which, upon the report of a Stockton man, is known to be among the mineral treasures of the estates. The surface is declared to be so beautiful that, lying at an elevation of 1500 feet above the sea level, the soil is luxuriantly fertile, and possesses vineyards, and peach and apple orchards, while hickory, oak, magnolia, maple and black walnut are among the growing timber. Will it be believed that this property, in such a region, has been bought at no more than about 6/ an acre? Yet that is the price at which the sale has been concluded. How far these capitalists at Stockton will invite other capitalists to join them in this venture is not declared; but that certain of the iron and coal masters of the North of England have largely invested in it there is no room to dispute. Whether these gentlemen have had the benefit of Mr. Bell's views upon the wisdom of the enterprise we do not know. It is hardly to be expected that they have not. It may be that they have been encouraged to form this company by the undoubted profit which has attended the purchase of shares by English iron masters of some mineral and blast furnace properties already in process of development in the United States. To our knowledge those shares have brought to their owners better dividends than has followed upon the investments in their own all but exhausted property of the same class at home. This, however, is not saying much.

The following composition is said to preserve iron from rust, and also to be applicable to other materials, such as stone or wood, used in conjunction with iron or other metal, in the formation of reservoirs or other works: Virgin wax, 100 parts; Gallipoli, 125; Norwegian pitch, 200; grease, 100; bitumen of Judea, 100; gutta-percha, 235; red lead, 120; and white lead, 20, all of which, says the inventor, have their special value. The materials are mixed in a boiler in the order in which they are given, the gutta-percha being cut up in small pieces, or rasped. The mixture must be well stirred at each addition, and, when homogeneous, is poured into molds, and looks like chocolate. When used for preserving iron from rust it is melted and laid on with a brush; but for stopping holes, &c., it must be in a pasty state. It may also be used as a glue to fix a piece of metal over a hole. For certain purposes, such as stopping holes in large vertical metal surfaces, the composition is slightly varied, the Gallipoli being reduced to 115, the bitumen to 90, and the red lead to 100, while 40 parts of gum copal are added next to the gutta-percha.

The Bellair, O., Nail Company is putting in ten new self-feeding nail machines.

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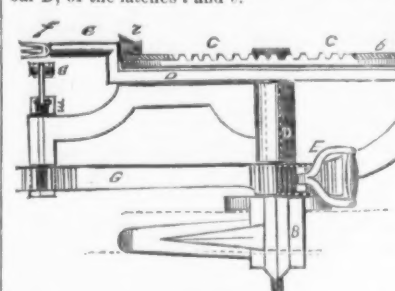
New Patents.

We take from the records of the Patent Office in Washington the following specifications of certain patents lately issued, which will be found interesting:

APPLE PARER.

To E. L. Schanck, Pleasant Mount, Mo.—1. The combination of the wheel C, having cogged semi-circle b, the bar D, with tubular bearings e, fork f, and pintons i.

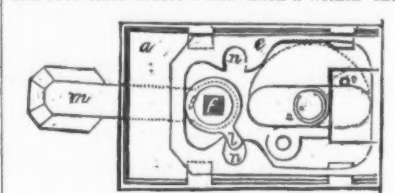
2. The combination, with the wheel C and bar D, of the latches t and v.



3. The cogged slide G, operated by lever E and segment h, in combination with the segment k and vertical shaft m, provided with knife paring lever H.

REVERSIBLE LATCH.

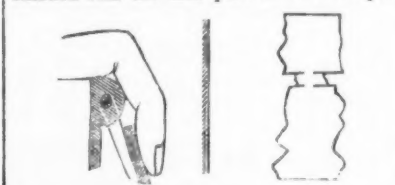
To Elisha C. Hussey, Rutherford Park, N. J.—The reversible frame c and latch d within the



case, and the arm l, spindle f, and weighted handle m, constructed and arranged as specified, so that the arm l enters the notch a in the lower part of the frame c, and acts to project or retract the latch by a direct movement.

MORTISE LOCK FOR SLIDING DOORS.

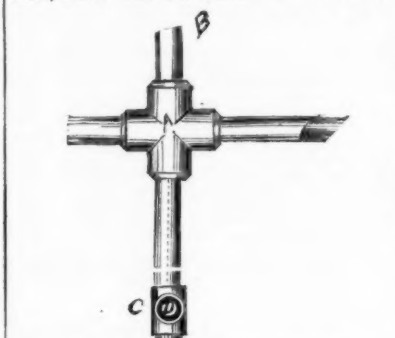
To B. Mallory, New Haven, Conn.—In combination with the face plate of a lock or pull



for sliding doors, constructed with a finger opening and recess in rear of said plate, a self-closing flap for said opening.

SAW BUCK.

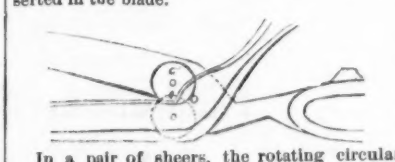
To R. C. Hayton and Chas. A. Huriburt, Ypsilanti, Mich.—The saw buck is formed of sec-



tions of metal tubing, which are secured in place by two hollow metal crosses, forming sockets for the reception of the ends of the sections, and a foot brace of the same attached to the legs of the buck by a T shaped socket joint. The combination of the cross A, arms B, T joints C, and foot brace D.

TAILORS' SHEARS.

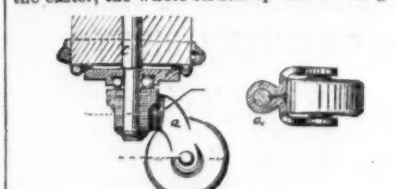
To Maurice E. Pless, North Manchester, Ind.—At the rear end of each blade a circular rotating cutting disk is secured upon a pin inserted in the blade.



In a pair of shears, the rotating circular cutters, e e', attached, respectively, to the rear end of each blade in such manner that their exposed surfaces shall be on a line with the inner sides of the blades.

FURNITURE CASTERS.

To Cecelia B. Sheldon, New York, N. Y.—Forming a rolled up eye for the swivel pin of the caster, the whole struck up from a single



piece of sheet metal in such manner as to cheapen construction.

The improved one piece sheet metal horn a, having the rolled up eye a'.

WRENCH.

To Isaac W. Heysinger, Philadelphia, Pa.—The moveable jaw is connected to the station-



ary jaw by means of a T shaped projection and a clamping screw arranged at its opposite ends.

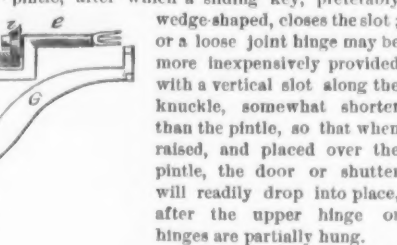
1. The combination of the slotted toothed

bar A, the movable toothed bar B, provided with the button F, and lug H, and the clamping screw C.

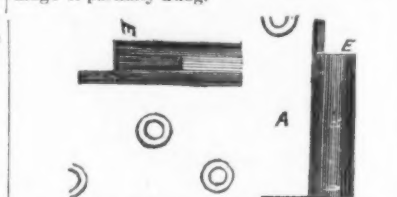
2. The clamping screw C, passing through a slot in the main bar A, into the lug H, and the rear portion of the movable bar B.

HINGE.

To Samuel T. Davis, Washington, D. C.—The lower hinge of a pair or series of loose joint hinges is slotted the entire length of the eye-piece or knuckle, thus enabling it, after the upper hinges are hung, to be placed on the pintle, after which a sliding key, preferably



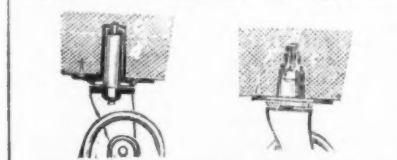
wedge-shaped, closes the slot; or a loose joint hinge may be more inexpensively provided with a vertical slot along the knuckle, somewhat shorter than the pintle, so that when raised, and placed over the pintle, the door or shutter will readily drop into place, after the upper hinge or hinges are partially hung.



1. A loose joint hinge in which the eye-piece or knuckle A is provided with a slot, E, which is closed by a sliding key, C.

FURNITURE CASTERS.

To Cecelia B. Sheldon, New York, N. Y.—A hard metal washer is interposed near the top of a stamped or struck up spindle socket, the spindle passing through the washer and riveted above, the object being to give solidity and bear the weight without wearing away the soft



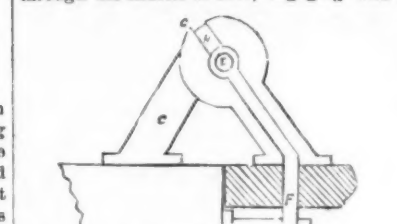
metal. There may also be a shoulder for the washer formed in the socket by a contraction of the upper ends thereof, the spindle in each case passing entirely through and riveted above.

1. The combination, with spindle and spindle shaft, of bush or washer C, secured in the socket by the spindle end passing through the same, and riveted above.

2. The shoulder for washer or wearing bush, formed in the socket by a contraction, F, at the upper end thereof, the spindle passing through and riveted above the socket.

LOCK HINGE.

To John Aikman, Norwich Township, Oxford county, Canada.—A detachable lever or latch interposed between the two parts of a shutter hinge, one end passing over and working upon the pintle of the hinge, while the other projects through the shutter or door, engaging with a



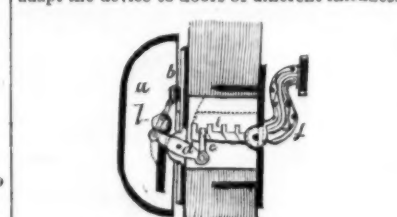
holder or catch on the inside, and likewise serving as a lifting device. There is also a slot in the lower part of the hinge, and a shoulder, so arranged that the lever or latch drops into the slot, and presses against the shoulder, to fasten the hinge when the shutter or door is wide open.

1. The detachable lever or latch F, working in the hinge on the pivot or pintle E, and fitting through the stile of the blind B, in combination with the holder or catch I on the window frame, substantially as shown and described.

2. The slot H in the lower part of the hinge C, in combination with the detachable lever or latch F and the shoulder G, all operating together substantially as and for the purposes above set forth.

BELL PULL.

To Stephen D. Arnold, New Britain, Conn.—The inner end of the lever may be cut off to adapt the device to doors of different thicknesses.



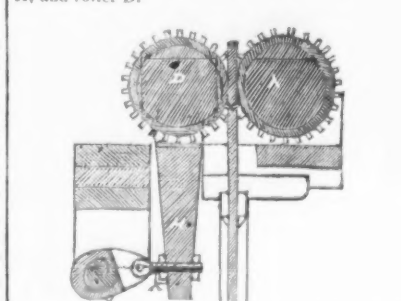
The lever bell pull f g, pivoted to the plate r, and provided with two or more wards, i i, in combination with the bridle e, lever d, hammer t and bell a.

DROP HAMMER.

To F. A. Pratt, Hartford, Conn.—The roller is carried in a rocking frame, and is caused to approach toward and recede from the strap by an eccentric connected adjustably with said frame. An arm projecting from the eccentric is connected with a lever which carries an adjustable dog, against which a lug on the ham-

mer strikes in ascending, turns the eccentric, and draws the rocking frame and roll away from the strap.

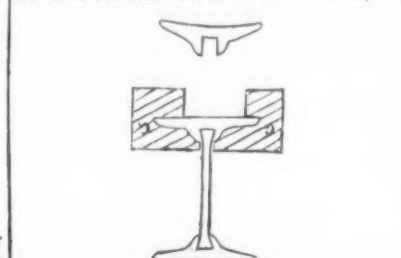
1. The combination of the eccentric I, adjustable connecting device J K, rocking frame H, and roller D.



2. The combination of the rod and dog M O with the eccentric I and the adjustable connecting device J K, for the purpose of operating the rocking frame.

3. The combination of the treadle T with the rod M and the devices O I J K, for turning the rocking frame H and releasing the weight.

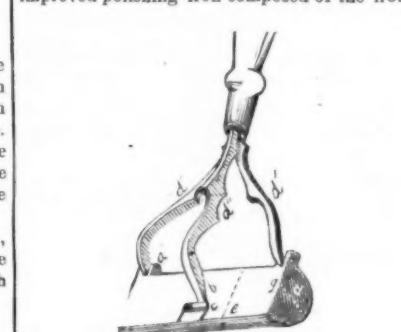
MANUFACTURE OF METALLIC BEAMS AND GIRDERS. To Andrew Klonan, Pittsburgh, Pa.—The heads of the beam are first rolled to form, and



then passed between other rolls that straighten the base and throw the edges of the lips inward toward one another, thus forming a dovetailed groove. The rolled web is then passed endwise into the grooves of the heads, and the whole is then passed between rolls that compress the lips down upon and around the dovetailed edges of the web. The manufacture of beams in detached parts, with dovetail joints united and compressed.

POLISHING OR SANDING IRON.

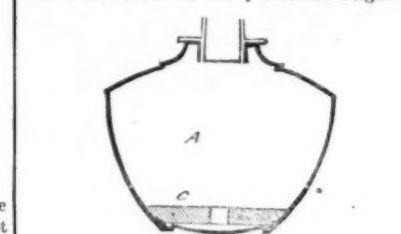
To Wm. B. Sanders, Lock Haven, Pa.—The improved polishing iron composed of the iron



a, having lugs a', mortise b and button c, and the handle d, having the arms d', constructed as described, and arm d', having the extension d'.

OILER.

To Russell B. Perkins, West Meriden, Conn.—The combination of the perforated weight C



and the concavo-convex elastic disc D within, and so as to form the bottom of, an oiler fount, A.

The Engineer, commenting upon the profits of English iron masters, says: There is a feeling pervading the minds of practical men in the iron districts, and finding expression there when they discuss the elements of business success, to the effect that these are to be found rather in comparatively small than in very extensive concerns. There are such concerns in Mid-England, in particular, where good profits are being made, notwithstanding that at neighboring iron and engineering works of much larger proportions losses are being sustained. The keenness of the prevailing competition admits of little room for managerial charges, or for waste either of time or materials, however small, in individual cases. The current of public favor is, therefore, no longer running in the direction of extensive joint stock undertakings, but rather toward what has been aptly termed "comfortable little concerns," where economy can be practiced and enforced from one center. Our correspondent's letter this week from the Birmingham district speaks of an engineering concern of no very large proportions where the year's profits would have justified a dividend of 20 per cent., after writing off a good sum for depreciation, and where 10 per cent. has been divided, at the same time that prudent provision has been made for any eventualities in the future. Nevertheless it is also satisfactory at such a period to note that at the annual meeting on Wednesday of John Brown & Co., of the Atlas Iron and Steel Works, Sheffield, a 10 per cent. dividend was accepted, and £10,000 carried to next account. On the same day Charles Cammell & Co., the well known iron and steel makers, of the same town, declared a dividend of 7½ per cent.

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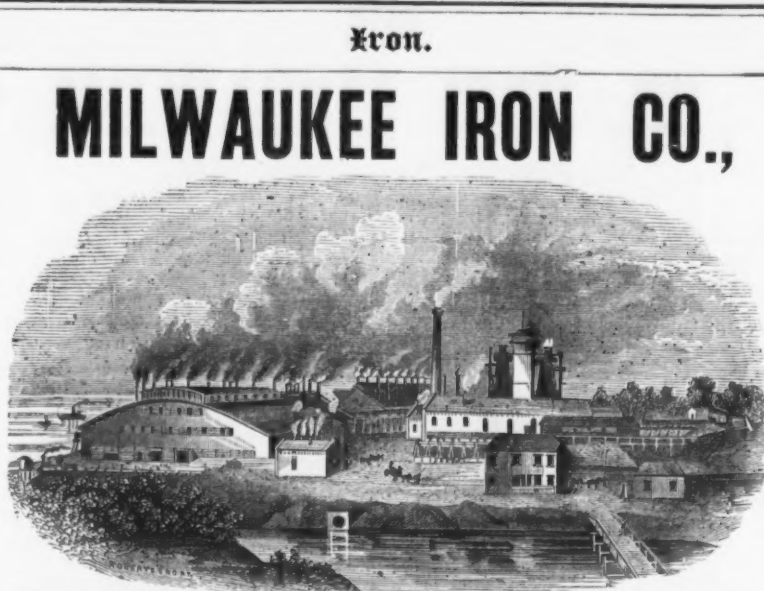
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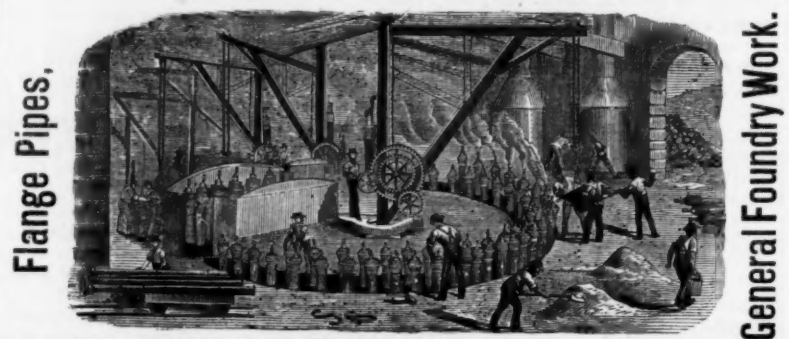
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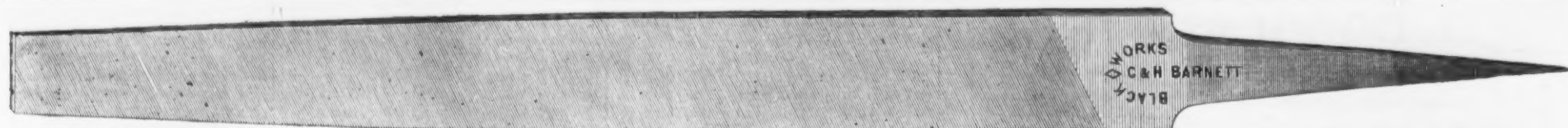


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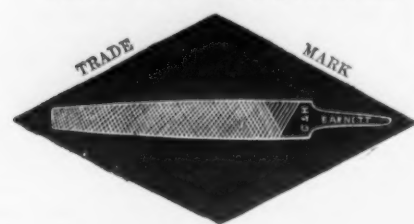
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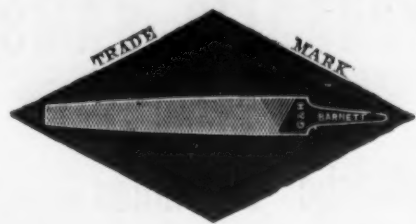
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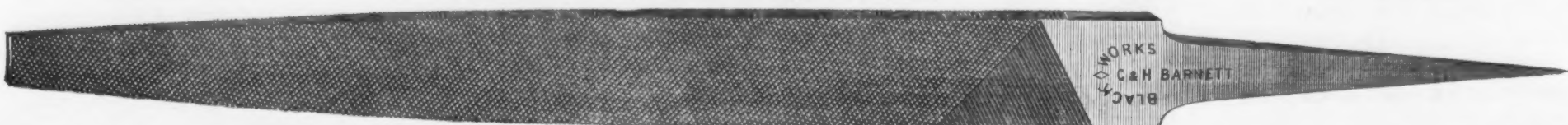


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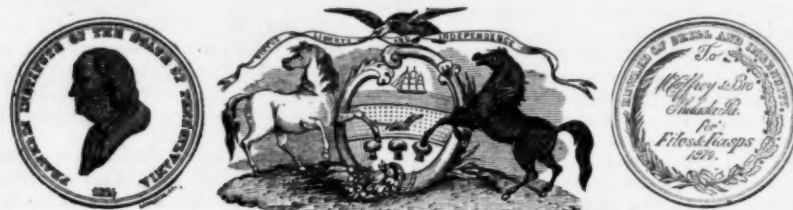
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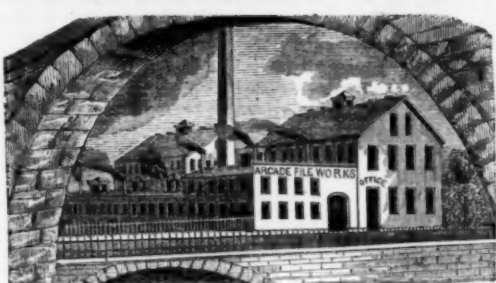
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Messrs. ARNOLD & CO., 310 California St., San Francisco. Sole Agents for the Pacific Coast.

C. T. DRAPER & CO.
Sing Sing, N. Y.
Manufacturers of SUPERIOR
HAND CUT

ESTABLISHED 1848.



FILES and RASPS
Made from Best
ENGLISH CAST STEEL.
Quality guaranteed by written warranty
when required.

JOHN I. BROWER & SON,

Hardware Merchants,
288 Greenwich Street, NEW YORK.

HORSE SHOES. Putnam's, Globe, Vulcan, Ausable, Ausable Pointed & Polished, Ausable Pointed & Blued.
Horse Nails. Thos. Turner & Co.'s, Sheffield Eng. TOE CALKS, Winsted, HAY RAKES, Breakenridge's.



PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a Combination which has no equal. For Circulars and Price List, address,

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

L. B. HELLER & CO.,

Manufacturers of Celebrated

American Horse Rasps and Files.

OFFICE, 190 Market Street,
P. O. Box, 223. NEWARK, N. J.

Importer and Manufacturer of
Steam Water Gauges,
Pipe and Fittings,
Scotch Glass Tubes,
Tube Expanders,
Twist Drills,
Emery Wheels,
Pipe Fitters' Tools,
Moulders' Tools,
Blacksmiths' Tools,
Machinists' Fine Tools
Forges,
Hammers,
Wheelbarrows,
Wrenches,
Jack Screws,
Vises,
Flue Brushes,
Waste,
Belting,
Hose,
Packing,
Stubs' Goods,
Hair Felt,
Polishing Felt,
Emery Cloth,
Hand Drills,
Iron Punches,
Iron Shears,
Files,
Governors,
Bolts,
SEND FOR PRICE LIST.

ELIAS G. HELLER.
PETER J. HELLER.
GEO. E. HELLER.
JOHN J. HELLER.
We invite the attention of the trade to our Celebrated American Horse Rasps and Files. These Rasps are made from the very best American Steel, all cut by hand, and we warrant them equal to any other make in the market. For the information of persons unacquainted with our goods, we will state that every File or Rasp manufactured by us, since our establishment in 1866, have been stamped "Heller & Bros." though commonly called the "Heller Rasp." All Rasps not stamped as annexed diagram are not genuine. We will send sample lot, if requested, and if not as represented they can be returned, or held subject to our order, free of all charges. For sale by the leading Hardware Dealers in the United States.

BACKUS BROTHERS,

Manufacturers of

The Backus Water Motor.

Cor. Wright St. and Ave. A,
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What They will do.

These Motors are adapted to running light machinery, such as Coffee Mills, Printing Presses, Lathes, Drug Mills, Church Organs, Sausage Cutters, Ice Cream Freezers, Elevators, Hoisting Machines and everything requiring similar power, in cities or towns where there are Water Works.

And the best "Motor" in the world for family sewing machines. Send for Circular.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,
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FILES AND HORSE RASPS,

And Importers of

STUBS' FILES, TOOLS & STEEL,

W. J. Davies' Sons' London Emery Cloth,
HUBERT'S FRENCH EMERY PAPER.

EVERY FILE WARRANTED.

Equal to the
BEST.

Western Files. Western Files. Western Files. Western Files.
Works, Beaver Falls, Pa. Office, 96 Chambers St., N. Y.
LARGEST CAPACITY
Of any File Works in the World.

AUBURN FILE WORKS,

Superior Hand-Cut

FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

FULLER BROS., Sole Agents,

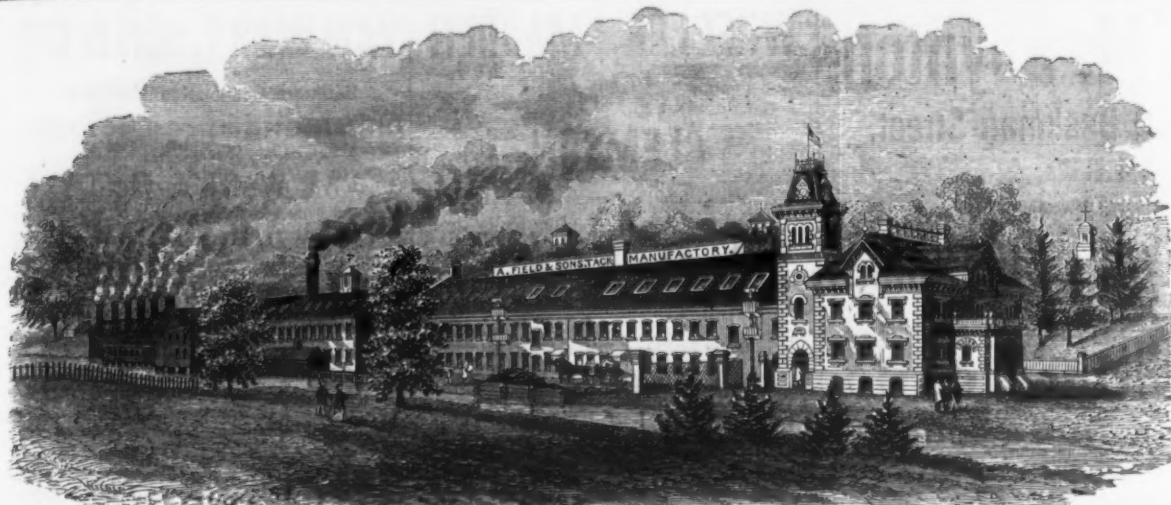
89 Chambers and 71 Reade Streets, N. Y.

JOHN ROTHERY'S Celebrated Hand-Cut FILES,

Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
83 Chambers and 65 Reade Streets, N. Y.





A. FIELD & SONS,

TAUNTON, MASS., Manufacturers of
COPPER & IRON TACKS, TINNED TACKS,

SUPERIOR SWEDS IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.
American and Swedes Iron Shoe Nails,
Zinc and Steel Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk
and Clout Nails, Hob and Hungarian Nails, Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails,
Fine Two Penny & Three Penny Nails, Channel, Cigar Box & Chair Nails, Leathered Carpet Tacks, Glaziers' Points, Etc.
OFFICES AND FACTORIES AT TAUNTON, MASS. WAREHOUSE AT 78 CHAMBERS STREET, N. Y.,
where may be found a full assortment of Tacks, Brads, &c., for the accommodation of the New York Wholesale and Jobbing Trade.
Any variations from the regular size or shape of the above named goods made from samples, to order.

Hopkins & Dickinson Manufacturing Co.,

FINE METAL WORKERS,

Works, Darlington, N. J.

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Hand Made Locks and Real Bronze Hardware.

NEW AND ARTISTIC DESIGNS FOR:

Private Residences, Banks, Churches and Public Buildings.

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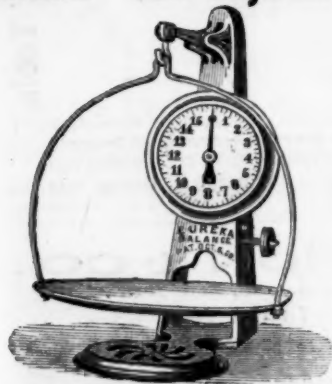
FOR HOTELS, OFFICE BUILDINGS, STORES,
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348 Broadway, New York.

Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining
the tare of a dish or other receptacle used in
weighing without the use of weights or loss of
time.
Manufactured only by

JOHN CHATILLON & SONS,

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THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.

Surplus - - \$1,800,000, Gold.

The New York Agency, 50 Wall St., N. Y.

Boys and sells Sterling Exchange, makes Cable
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Machinery
Mfd. by
CRANE BROS.
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CROCKER BROTHERS,

32 Cliff Street, N. Y.
METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I.

WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

HORSE AND MULE SHOES.

AMERICAN LOCK MFG. CO.,

Manufacturers of

FELTER'S

Locks & Latches,

Comprising

Store Door Locks, Night Latches,

Drawer, Desk and Pad Locks,

All of which are furnished with

SMALL, FLAT, AMERICAN STERLING METAL KEYS.

Which are stronger than steel, and cannot be affected by rust, and will remain bright and clear under all ordinary circumstances.

A candid examination will convince the most unbelieving, that for simplicity, durability, convenience, and safety, they challenge comparison with any now before the public. Being made entirely by new and expensive machinery, especially constructed to manufacture them, they will rival the best made locks in finish and perfect operation.

These locks give perfect satisfaction, because they are the safest, cheapest and most durable lock ever presented to the public, having thirty-five finely finished Brass Tumblers in each Door, and twenty-eight in each Drawer Lock, each one being finely notched.

Each tumbler bearing on the key at two different points while locking or unlocking, without the aid of springs, which cannot be said of any other patent Tumbler Locks in use.

THE LOCKS ARE FITTED TO THE KEYS,

And not the Keys to the Locks.

Hence Counterfeit Keys cannot be made.

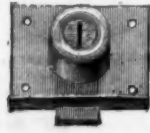
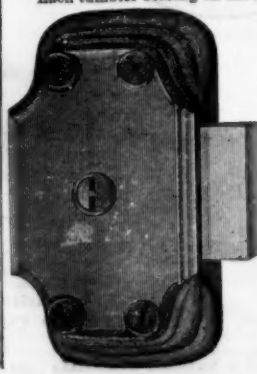
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AMERICAN LOCK MFG. CO.,

OFFICE and WORKS, Cazenovia, N. Y.,

Or, UNION NUT CO., Agents,

78 Beekman Street, New York.



BUSINESS ITEMS.

NEW JERSEY.

The Wilson Iron Company, whose offices are at No. 96 John street, in this city, announce that they are now successfully working the Wilson process for the manufacture of wrought iron direct from the ore, at their mill in New Jersey, where it may be seen by all who are interested. We are informed that they are making blooms of superior excellence and purity with 140 bushels of charcoal to the ton, and puddled bars with a ton of coal to the ton of iron. Specimens of rolled iron made from these bars, tested hot and cold, show remarkable toughness and ductility. The Wilson plant and process was described in *The Iron Age* of October 23d, 1873. We have not had an opportunity of examining the improvements made since that time.

PENNSYLVANIA.

The Warwick Iron Co. (Pottstown) will soon complete their new and extensive furnaces, and are furnishing themselves with some of the most improved machinery, among which are two of Riehle Bros. "self-adjusting" railroad track scales, also the celebrated furnace charging scales made by this firm.

There has been constructed recently, at the extensive iron works of Messrs. Carter & Allen, in Tamaqua, a monster cast iron drum for the Franklin Coal Company, of Wilkesbarre, the total weight of which is 40 tons; the length of the shaft is 15½ feet; diameter of the drum 12 feet; weight of each segment, 2 tons, 5 cwt.

The rolling mills of the McCullough Iron Company, including those at North East, Elkton and Rowlandville, Md., are in operation, but are suffering from the lack of sufficient water in the streams by which they are run—the Elk Creeks and the Octoraro. The company are making every effort to complete their two new mills in Wilmington, which will be run by steam, and hope to get them in operation in July.

The works of the North American Smelting Company, Middletown, cover an area of 152x200 feet, and are four stories in height. The specialties of their manufacture are Babbitt, type, and stereotyped metals, tin and copper-smiths' solders, pig and brass, and composition castings.

The Armat Mills, with steam engines and machinery, on Armat street, Germantown, lot 296x152 feet, has been sold at auction for \$35,000.

The Susquehanna Iron Works, Middletown, are making many large castings for the Pennsylvania Steel Works. The machine shop of this establishment is 50x100 feet in area and three stories high. The second floor is the pattern shop, and the third used for the storage of patterns. The foundry is quite large, being 120x75 feet in area, and has two cupolas, one of 20 tons capacity, and the other of eight tons. The machinery is driven by two engines of 25 horse-power each, and 60 hands are employed in the machine shop and foundry.

The Williamsburg, Blair county, furnace is again in blast, and the workmen of that town are correspondingly happy.

Ground was broken a few days since for a foundry and machine shop at Beaver Falls. The foundry will be 100x60 feet, and will have machinery for making molds—in brief, a complete outfit for making all kinds of iron, steel and brass castings. The machine shop will be 100x40 feet, two stories, and will be furnished with a full complement of lathes and other tools for doing all kinds of work in this line.

New machinery is being put in to increase the capacity of their works by the Pittsburgh Hinge and Butt Factory, located at Beaver Falls. The factory is running to its full capacity, with orders two months in advance.

MASSACHUSETTS.

The National Bridge Company, of Boston, will build the three iron railroad bridges of the viaduct over Front, Mechanic and Bridge streets, in Worcester, and J. R. Smith of that city will superintend the work as agent for the railroads.

Delaney & Son, Haydenville, are pushing the work of rebuilding the dam at Hayden, Gere & Co.'s brass shop. Ten men are at work on the dam, and ten more are working at the quarry of F. Loomis, Mountain street, quarrying stone for the dam.

The Valley Machine Company, at Easthampton, have just completed and shipped to Washington, for the Capitol building, a Wright's patent bucket plunger steam pump. This pump was made from special patterns, and has a 12 inch steam cylinder and 7 inch pump cylinder, and is to be used for feeding the boilers on the House of Representatives side of the building, and also for supplying the tanks which furnish the water for closets, baths, &c.

B. F. Mullin, of Holyoke, has just shipped two 60 horse-power boilers to Hayden, Gere & Co., at Haydenville.

Lyman H. Goodnow, Worcester, has, during the past month, been shipping machinery to Trenton, N. J., Cincinnati, Ohio, and various places in Connecticut. In order to obtain better facilities for his business, he has now removed to Fitchburg and become associated with H. W. Page, of the late firm of Smith & Page, at Fitchburg.

MAINE.

In the tanneries at Kingman and Vanceborough huge revolving cylinders have been put in to wash the leather, the water flowing through the cylinder. This arrangement saves much time and labor.

VERMONT.

The St. Alban's rolling mills are running on the iron for the Woodstock Railroad, which is now about half completed.

The Vermont Farm Machine Company, at Bellows Falls, are now employing from fifteen to twenty men. They manufacture the "Gleaner" horse rake, and have sold about 1200 this season. They have also manufactured about 400 of their evaporators for the manufacture of maple sugar.

RHODE ISLAND.

A new enterprise in the form of the Hautin Sewing Machine Company, with a paid-up capital of \$500,000, has recently been organized in Woonsocket, and will begin operations at an early day. The company has leased rooms and power of the Woonsocket Machine Company. The Hautin machine is a French invention, having been used in Europe some ten years. Its peculiar merits are said to be its adaptability to the manufacture of all descriptions of leather work—the manufacture of harnesses, boots, shoes, saddlery, carriage tops, etc.

WISCONSIN.

Van Brunt, Barber & Co., Horicon, manufacturers of the Van Brunt Seeder and Horicon Farm Wagon, sold last season 2300 seeders. This season they have added to their business the manufacture of a fanning mill. They give employment to 100 men. Last year they used 200 tons cast iron, and 100 of bar iron and 300,000 feet of lumber. They occupy nine buildings and their works cover five acres of ground.

MICHIGAN.

The Marquette & Pacific Rolling Mill Furnace is now turning out an average make of 40 tons per day, all No. 1 iron, suitable for Bessemer steel, for which use 5000 tons have been sold to Chicago parties.

OHIO.

The Edge Tool Co.'s building, in Leetonia, is nearly completed.

A certificate increasing the capital stock of the Cleveland Iron Company from \$300,000 to \$500,000 has been filed in the office of the Secretary of State of Ohio.

The steam riveting machine, Cleveland, recently erected in the new boiler shops of the Fulton Iron Works, performs its duty most effectually and with rapidity. To be rid of the incessant rattle of hand riveting is of as much value as the machine. Beside by one blow this machine does the work better than it is done by hand.

The Siemens Gas Furnace.—The Bulletin of the Iron and Steel Association says: Upon application, we have received from the United States agents, Messrs. Richmond & Potts, of No. 119 South Fourth Street, Philadelphia, the following statement of the number of Siemens' regenerative gas furnaces now in use in this country: "There are 32 crucible steel-melting furnaces in operation, capable of producing over 45,000 net tons of cast steel per annum, and 14 open-hearth furnaces, for the manufacture of steel by either the scrap or ore process, of a working capacity of 35,000 net tons per annum. Also, throughout the various iron and steel works of the country there are 56 of the Siemens gas heating furnaces in operation, capable of heating, on single turn, over 300,000 tons of iron and steel per year of 270 working days. In addition to the above, there are in successful operation a number of single and double puddling furnaces, glass furnaces, etc., and there are in present course of construction 44 furnaces, to include crucible steel-melting, open-hearth, heating and puddling furnaces. The furnaces which are enumerated above have, for the most part, been erected within the past year or eighteen months." In the vicinity of Philadelphia the nearest establishments in which these furnaces are now in use are the new plate rolling mill, at Chester, Pa.; the Midvale Steel Works, at Nicetown, Pa.; and the Tasker Iron Works, at New Castle, Del.—the last establishment using them for welding boiler and gas tubes.

A novel method of raising coal has been tried for some time in the Creuzot mining district, in France. An air-tight tube is fitted from top to bottom within the shaft of the mine; in this tube a piston works; to this piston a cage is attached, in which the tubs of coal are placed, and the tube is further fitted with valves and doors for regulating the supply of air, and running the tubs in and out. Air being admitted beneath the piston, the latter ascends with the coal to the top, and at the same time more than 70,000 cubic feet of foul air is discharged from the mine, while a corresponding rush of fresh air enters from the surface down into the workings. The same apparatus which raises and lowers the tubs will also raise and lower the miners.

The Reading Times says: The new Sheridan Furnace has gone into operation. The Port Clinton Rolling Mill will be put in operation on the 12th instant. The Donaghmore Furnace, at Lebanon, is in blast again and working well. Mount Hope Furnace, on the southern slope of the Cornwall Hills, in Lancaster county, is to have a hot blast, an order for one having been sent to Painter & Son, of Myerstown. Messrs. Welmer & Birkinbine, of Lebanon, have contracted to manufacture for the Temple Iron Company, this county, a vertical high pressure blowing engine, a steam hoist, and all the castings and fixtures necessary for the remodeling of the furnace.

The Reading Eagle gives the following cheerful outlook of the business situation in that vicinity: The Reading shops now running on full time, commencing at a quarter to seven, working until twelve, beginning again at 12:45 and working until six o'clock, and stopping at half past 4 o'clock on Saturday afternoon. Some of the gangs in the lower shops are working on nearly double time, and the men are pushed to their full capacities. New freight and passenger engines are being built, and a great many repairs to locomotives and cars are being made. Trade on the road is brisk and lively.

The Erie City Iron Works, Erie, are employing 125 people upon boiler, engine and saw mill machinery work, mainly for the extreme Southern country. They are operating a steam riveter in the manufacture of their boilers, which will make considerable noise in the mechanical world. One of them is being put up in the new boiler shop of the Globe Iron Works, Cleveland, which will soon be put to practical test.

GEORGE GUEUTAL & SON,

39 West 4th St., New York.



Wood Screws, Steel in Sheets,

BAND SAWS, TOOLS FOR BRAZING, &c.

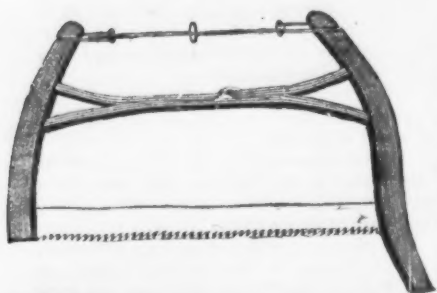
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,

MANUFACTURER OF

Saws of all kinds.

FACTORY, WILLIAMSBURG, N. Y.



Elliptic Forked Saw Frame.

Patented June 28th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

AMERICAN SAW CO.,

Manufacturers of

**Movable Toothed Circular Saws,
PERFORATED CROSS-CUT SAWS
And SOLID SAWS of all kinds.** Trenton, N. J.**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.

Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO., Indianapolis, Ind.**, who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.
E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

MANUFACTURERS OF

**Bonney's Hollow
AUGERS.**

Stearn's Hollow Augers

Band Saw Vises

Bonney's Spoke Trimmers

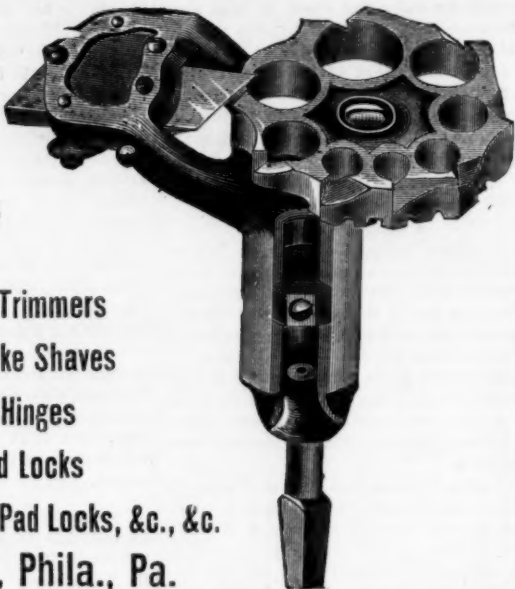
Double Edge Swoke Shaves

Adjustable Gate Hinges

Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

**Machinery without Lubricant
METALINE.**

Machinery Metalined, or Metaline furnished to Machine Builders.

No oil or attention required. Runs with little or no wear. No dirt or danger from fire. No damage to goods in process of manufacture. Years in use by best concerns, who are refitting old, and ordering new machinery to be metalined.

AMERICAN METALINE COMPANY,

61 Warren Street, New York City.



THE CELEBRATED

Yale Locks

FOR ALL USES.

Ornamental Real Bronze Hardware.
YALE LOCK MFG. CO., Stamford, Conn.
Salesroom, No. 298 Broadway, New York.

E. M. Boynton,80 Beekman Street,
NEW YORK,

Manufacturer of

Saws of all kinds.

Also Sole Manufacturer of

LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on M tooth.

Telegram Dated Oct. 1st, 1874.

STATE FAIR, EASTON, PA.

To HENRY DISSTON & SONS:

Philadelphia, Pa.

I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. **E. M. BOYNTON.**

E. M. Boynton gave on Wednesday of last week an exhibition of what his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets.—*The Iron Age*, Oct. 8, 1874.

For fuller report of this exhibition see the *Eastern Morning Dispatch* of Oct. 1st, 1874.
Henry Disston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

J. FLINT,

Manufacturer of

**ALL KINDS OF
SAWS**

And Plastering Trowels,

ROCHESTER, N. Y.

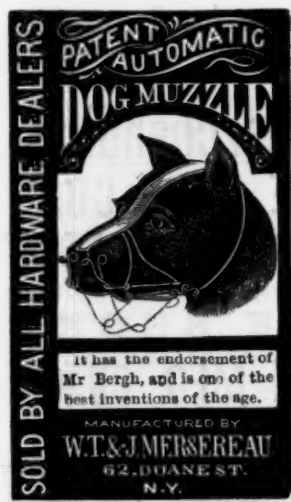
A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. **Dietrich's Double Handle One Man Cross Cut Saw** made with any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. Send for Illustrated Price List.

**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Bolles Hoe" or any Hoe in market.

For Sale at Manufacturers' Prices by

RUSSELL & ERWIN MFG. CO., - - New York.
BYRNE & FITZSIMONS, - - Albany, N. Y.
KENNEDY, SPAULDING & CO., - - Syracuse, N. Y.

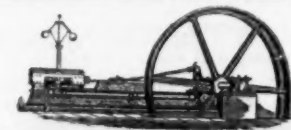
**HARRIS & WESTON,
Nickel Platers**

182 CENTRE STREET,

Corner Hester, **NEW YORK.**

Fourth Avenue cars pass the door.

We guarantee our Nickel not to Strip or Peel.

**The Hartford Foundry & Machine Co**

Successors to the

Woodruff & Beach Iron Works,**HARTFORD, CONN.**

J. S. Hunter, Pres. **E. J. Murphy, Treas. & Sec.**
High and Low Pressure Marine & Stationary
STEAM ENGINES AND BOILERS,
Minlog, Powder & Paper Mill Machinery,
And every variety of Iron and Composition Castings
made to order.

The following are a portion of the Engines manufactured at these works, and are a sufficient guarantee of our capacity for doing first-class work, viz.: The Pumping Engines in the cities of Brooklyn, N. Y.; St. Louis Mo. and Hartford, Conn., and in the Charlestown, Mass., and Norfolk, Va. Navy Yards, and the engines in the U. S. Steam Sloops of War Michigan, Kearsage, Manitou, Minnetonka and Piscataquis and the Gun Boats Cayuga, Pequot and Nepesic, the Government Transports Dudley Buck and Geo. C. Collins, and the Steamships America and United States. Also the large Horizontal Engine for the new Plate Mill of the Bay State Iron Co.

WHEELER, MADDEN

&

CLEMSON,

Manufacturers of Warranted Cast Steel

SAWSof every description,
including

Circular, Shingle, Cross Cut,

Mill, Hand, Roberts' and

other Wood Saws,

&c., &c

Cast Steel Files

of the well known brand of

Wheeler, Madden & Clemson.

FACTORIES:

Middletown, Orange Co., N. Y.

BRANCH OFFICE:

97 Chambers Street, New York.

BRUNDAGE FORGED HORSE NAILS,

Manufactured from

BEST NORWAY IRON,by **BRUNDAGE & CO.** Sold by**WHEELER, MADDEN & CLEMSON**

Middletown, Orange Co., N. Y.



make a specialty of the **LARGEST SIZES OF Circular Saws**, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a **DEAD heat**, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed **BALANCES PERFECTLY**, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly straddled upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "**Challenge**" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

JAMES OHLEN.**V. G. HUNDLEY, Agent,**

79 Rensselaer St., N. Y.

NORTH CAROLINA HANDLE CO.,

(Wilson & Shober, Props.)

Manufacturers of
**AXE, PICK, GERMAN AND AMERICAN
SLEDGE, and other Handles.**
Full assortment always on hand.



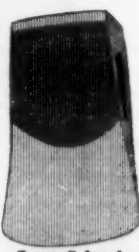
Western Beveled.



Kentucky.



Rockaway Pattern.



Long Island.



New Jersey.

BRONZED OR RED.

Price Per dozen, \$11.00 net cash.

Beveled Axes, 50c per dozen extra.

Send a Sample ORDER.

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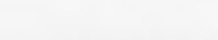
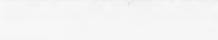
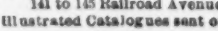
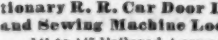
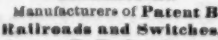
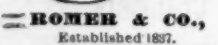
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MANUFACTURED BY

PEPPERELL,

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My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society, also a Medal and Diploma from the Mass. Mechanics' Ass'n Sept., 1860.



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PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, July 19, 1875.

It seems at last to be generally admitted that we are to have a really good fall trade in all departments, in which iron and its industries will share fully. Hence, everyone who can is snatching the opportunity to get a brief holiday before business revives. The week has been enlivened by some spicy testimony in the Reading Railroad Company investigation matter, and by Centennial matters, which are extremely active just now. In the Reading Railroad matter, which is an investigation by a legislative committee of certain charges against the P. & R. R. Co., of having engaged in business unlawful under its charter, to wit, the formation of the Coal and Iron Company, and the retelling of coal, the defence, as conducted by the president, Franklin B. Gowen, Esq., has brought out some facts which are of great interest to the public, and damaging to the enemies of the company. The parties who instituted these charges are understood to be the coal shippers at Port Richmond, and the Retail Coal Dealers Association. In the testimony for the prosecution, it was claimed that the weights of coal, as furnished by the Coal and Iron Co., were very generally short, and that unfair discrimination was made against the retailers in the matter of deliveries of coal cars. In the defence, Mr. Gowen sets out with stating that the amount of the charges is due first, to the fact that the Reading Coal and Iron Co. has, to a great extent, superseded the business of the coal shippers by doing the same work at a cost of 10 cents a ton for which they charged 30 cents; and by a better and speedier distribution to Eastern ports by use of steam colliers. In the matter of complaint from the retailers, he demonstrates that the company has furnished a better coal at a cost of \$1 per ton less direct to consumers. In the charge of short weights, he shows, by undeniable evidence, that the total shortage, all of which was allowed for on settlements, only amounted to 21 tons out of 12,000,000 tons annually. But the astute lawyer, who is president of both companies, went further than this. He attacked the retailers on their most tender point, and one in which he was sure to have the sympathy of the public with him if he substantiated his charges, as he has since done. He claimed that the parties complaining of his company were, systematically, cheating their customers by short weight on single ton deliveries. To prove this he had coal purchased in small quantities from these parties on 21 different occasions, and then weighed by a government weighmaster. In almost every case the amount fell short materially; in one case the shortage being 537 lbs. out of 2240 lbs., or nearly one-fourth of a ton; in another 427 lbs., with an average of at least 200 lbs. in all, or nearly so. At \$6 a ton the overcharge thus made was on some of this coal equal to \$1.88 per ton; the average overcharge was 61 cents per ton, while on the lowest, and which were evidently intended to be honest, it was nominal, or merely one cent per ton. But at this ratio of underweights, as proven by the average cases, Mr. Gowen shows that in the retail consumption of this city, amounting to one million tons annually, the people are swindled yearly out of \$610,000, which they pay for coal they never get, and if the highest deficiency were taken as an index, the swindle would amount to a million and a half a year. A year or two since we had inspectors appointed to see that the legal ton of 2240 lbs. was in all cases delivered, and all coal cars were examined, measured and stamped. The office is evidently a snare, and Mr. Gowen in his raid on the dealers has ventilated a subject very close to the pockets of consumers here and elsewhere, and which it behooves all to examine into for themselves.

Some time since I related the facts in the case of the assignee of Morris vs. Ervin, being the Southward Iron Foundry matter. Since, the case has come up in court, and the answer in his report to the press, and furnished in this correspondence. After argument, Judge Hare stated the difficulties in arriving at a conclusion, the case not having been set forth by the complainant as fully as it should have been, and if decided on plaintiff's evidence, as in a court of law, the decision would have been for the respondent. But, in equity, the case must be considered from the evidence of the respondent also, and it has been determined that what the respondent does not state tells as heavily against him as what he states does in his favor. The drawing out of the sum of \$100,000 was conceded, and respondent fails to show its meaning. The court was therefore compelled to conclude that this money came into his hands, and that he is indebted to that amount. There was further no explanation of the disposal of moneys deposited by Morris in respondent's name in Seventh National Bank, and the inference was they had not been applied to the trust. Hence the temporary injunction was continued, and Ervin restrained from transferring or disposing of any real estate or securities of which he was possessed, and the Seventh National Bank from paying him any money standing to his credit. Plaintiff to give security in the sum of \$20,000, which, in addition to the \$261,000 real estate security already entered for the assignee, was immediately furnished. So closes the Morris-Ervin fiasco, and with it probably ends Mr. Alexander Ervin's connection with the iron trade, in which of late years he has been somewhat conspicuous.

Last week I alluded to a magnificent prospect to construct a pneumatic dispatch tube under the Atlantic, and prophesied that before it was done, and the Keeley motor in operation, the problem of navigating the air would be solved, and both the former schemes useless. I scarcely supposed the latter would be so near at hand, but the Baltimore American comes to my rescue with the identical inventor wanted at the proper moment, and states that matter. A German gentleman, named Schroeder, formerly an officer in the British and American armies, and an ardent fan of La Montagne, has just patented the combination of balloon and mechanism which is to do the business. He has, further, interested capital, in the person of Mr. Ax, of the tobacco firm of Gail & Ax, to construct his aërostat, and Postmaster Jewell is "highly gratified." It is curious how government officials "tumble" to all the new things which come up. The German ambassador has also taken plans and specifications with him to Europe to submit to the German government. The invention provides for a boat, in the form of a life boat, 60 feet long, 10 feet wide and 12 feet high, the frame of wire and steel, covered by water-proof lumen. This vessel to be connected to and carried by a linen balloon capable of holding 70,000 cubic feet of gas. In the boat a 12 horse-power engine, which will drive the propellers, which are constructed as wind mills. Both propellers can be worked in one direction or one push and one pull. A gas machine will be attached to the balloon to supply the necessary gas for the voyage, and in case of a leak in the balloon other smaller ones filled with gas will be on hand, and when placed in the larger will stop the leak. Contracts are out for the

construction, and the machine to be ready August 5th, prox. Mr. Schroeder expects to voyage from Baltimore to New York (all roads lead to Rome) in an hour and a half, when wind is favorable. From New York to London he will go in 50 hours, and if he is trusted with postal matter to Europe, can complete the route from New York to Hamburg, Paris, Liebon and Washington in six days, the round trip. The total weight of the airship will be 2800 pounds, and, in addition to a mail, 14 passengers can be carried. Fortunately, August 5th is not far off, and we can afford to wait for this machine, which, at least, possesses the elements of possibility, and does not claim to move the world in a teaspoonful of water.

As if we had no iron ore, Duluth comes now to the front with a new iron mountain, 8 miles long, half a mile wide and 1200 feet high. "If a square yard, therefore, will contain 2 tons of iron ore, we may compute this enormous mass at 1!"—but we will wait until we see it.

The Time Lock at the Barre Bank.

To the Editor of the Iron Age.—DEAR SIR: In the issue of your paper for July 15th, giving to the public an illustration and description of a time lock, the writer of the article is evidently under a misapprehension which I will ask your courtesy to correct. Reference is made, in the article in question, to the recent attempt to rob the Barre National Bank, Vermont, and the writer seems to have supposed, and the implication is carried to the reader, that the lock which so successfully frustrated the attempted robbery was the lock which was the subject of the article. This is a mistake. The chronometer lock upon the vaults of the Barre Bank, at the time of the attempted burglary, was one of my own time locks—of my own invention, and covered by several patents granted to me, and was manufactured and placed upon these vaults by Sargent & Greenleaf, of Rochester, N. Y.

I append a note received from the cashier of the bank in question, before the attempt to break into the vault was made, which sufficiently attests the correctness of my statement.

NATIONAL BANK OF BARRE,
BARRE, Vt., May 13th 1875.

Messrs. Sargent and Greenleaf.—GENTLEMEN: I am instructed by our president to express to you the very good satisfaction your Double Chronometer Lock gives us. It adds greatly to the security of our valuables, and has been quite reliable in its working.

Yours, obediently, CHAS. A. KING, Cashier.

By inserting this you will oblige,
Yours, very respectfully, JAMES SARGENT,
of SARGENT & GREENLEAF,
ROCHESTER, N. Y.

July 20, 1875.

[In the article appearing in our issue of the 15th inst., to which reference is made, the dispatch describing the attempt to rob the Barre Bank was used merely as showing the utility of the time lock. The dispatch did not say by whom the lock in question was made, nor did we know anything more about it than that the efforts of the robbers to make the cashier the instrument of their crime were frustrated by the time lock which placed it beyond the power of that officer to open the vault, had he been willing to do so under threats of personal violence. There was no "implication" of any sort, nor did we know or care by whom the lock was made. The service rendered by it served our purpose by way of illustrating the utility of the principle embodied in all time locks for bank vaults.—Editor of The Iron Age.]

For more than a year past, says the Indianapolis Sentinel, Mr. Henry Stacy has been endeavoring to perfect plans by which coal tar, crude oils, &c., could be practically utilized for the purpose of making heat enough to melt iron of all descriptions, brass, generate steam, &c. One of these heaters was placed on a furnace at the Malleable Iron Works last week, where it required eight days and nights to anneal the iron with coal, but the heater did the work better in six days and nights, consuming but two and a half barrels of tar, costing \$1.50 per barrel. Mr. Stacy thinks he can run a locomotive a distance of 100 miles without a fireman at a cost of but 50 cents. The cost of each heater is not to exceed \$2 for each furnace. The tar, oil, &c., passes from the barrel, tank or reservoir through a small pipe, and is deposited in front of a steam and cold air injector that forces it into the furnace in the form of spray, making a perfect mass of flame, but no smoke or sparks.

There are eight completed Bessemer steel establishments in the country, and every one of them is running to its full capacity and is full of orders. Two of these are at Chicago, one at Joliet and one at Newburg, near Cleveland. The new Edgar Thomson Bessemer Works, near Pittsburgh, a magnificent plant, will soon be in operation, and the Bessemer plant of the Lackawanna Iron and Coal Company, at Scranton, will also be completed this year. At St. Louis the Vulcan Iron Works are at work on a Bessemer plant, to be ready in 1876, making the eleventh in the country. It will be observed that, if we include Pittsburgh, the West will have six of the eleven.

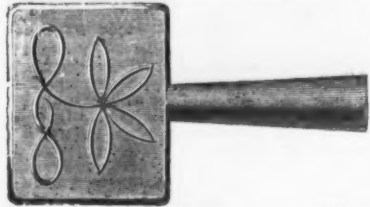
In Cape Colony about 800 miles of railway are about to be constructed at a cost of four or five millions sterling, and in New Zealand there are 550 miles of railway in construction, and 260 more authorized. India has already 5872 miles of railway open, while 1927 miles remain to be completed.

The Grove Brothers, Danville, Pa., have blown in their furnace, and everything works satisfactorily. The Pennsylvania Rolling Mill has started and the prospect is quite encouraging.

Messrs. Abel, Pedder & Co. are making good progress with their new steel works at Beaver Falls, Pa., one building, 150x60 feet, being under roof, and the two Skimens-Martin furnaces being well under way.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



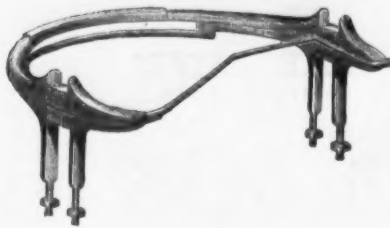
Leaf Pattern.

King Bolt Yokes.

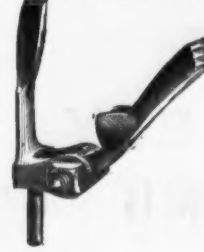


Established 1850.

No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

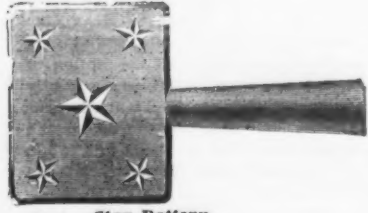
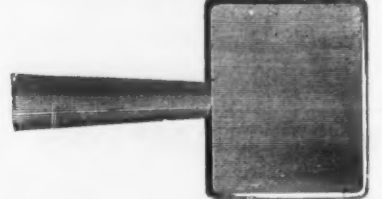


Upper View.



Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



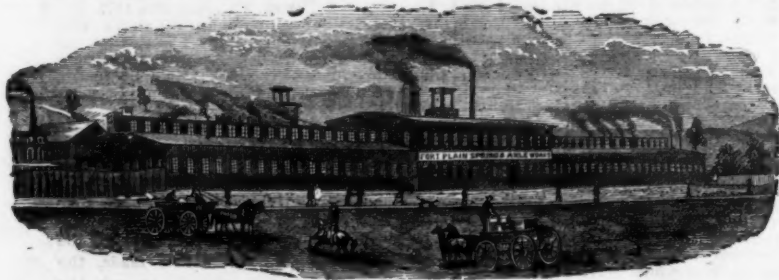
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MANUFACTURERS OF

English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,

Of any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE COLLAR to the FINEST OF STEEL.

Our facilities for manufacturing are very extensive, and with our recent additions of new and improved Machinery, we defy competition.

Send for Price List and Descriptive Circular.

CARRIAGE BOLTS.

Buy the Best.



Clark's Patent Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not turn in its place.

MANUFACTURED BY

CLARK BROS. & CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &c.

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MANUFACTURERS OF

SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws; Parallel Bench Vises; Sash Pullies, Ho House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Bows, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

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HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS,

Cold Punched Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws, Chain Links, Truck and Car Forgings, Bridge Bolts, Bridge Forgings.

IRONS AND RODS FOR BUILDINGS.

1330 Buttonwood Street.

PHILADELPHIA.

Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

From the Best Brands

of

NORWAY IRON.



Trade Mark.

The Celebrated

"STAR" Axle Clip.

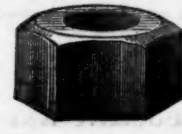
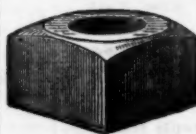
All Styles of

FANCY HEAD BOLTS.

Blank Bolts, Skein Bolts, Square Head Bolts, Plow Bolts, &c., &c., &c.

TOWNSEND, WILSON & HUBBARD, 2301 Cherry St., Philadelphia, Pa

Old Colony Rivet Works.

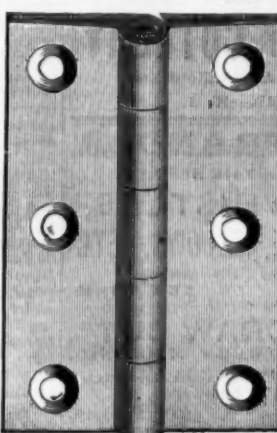


Rivets, Nuts, Washers, Lag Screws, Coleman's Eagle Carriage and Tire Bolts, Axle Clips, Felloe Plates, Shaft Couplings, Stove and Machine Bolts, Drilling Machines, Tire Benders, &c. Full stock constantly on hand.

Warehouse, 34 Warren St., N. Y.

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MANUFACTURERS OF
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DAM, NO 3 WATER ST., Gardiner, Me.
ALL GOODS
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Cast Brass Butt Hinges

BRASS RIM AND MORTISE LOCKS,
Ice House Hinges & Fastenings.

Manufactured and for sale by

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Manufacturers of

Brass, Galvanized and Ship Chandlery

HARDWARE.

290 Pearl Street, New York.

SARGEANT MFG. CO.,

Manufacturers of

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In Gold, Silver, Nickel, Japaned, Lined, & X C.
Sole Manufacturers and Patentees of various Patented
Improvements, including Gigs, Trees, "Imitation
Covered Mountings," Wedge Buckles, &c., &c.
73, 77 & 79 Summit St., NEWARK, N. J.



Write for Price List and Discounts.

Patented July 9th, 1872.



PATENT IMPROVED STEAM TRAP

The only self-regulating Steam Trap in the world.

For full description send for circular to

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Steam Main Establishment, 51 S. 4th Street Phila.



FRANKLIN S. MILES,
Manufacturer of
Brass, Iron, Steel and German Silver
SCREWS.
205 Quarry Street, Philadelphia.

Alexander Brothers, Manufacturers of OAK TANNED

Leather Belting

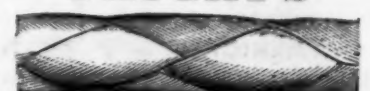
410 & 412 North 3d, Philadelphia, Pa.

CHARLES W. ARNY,

Manufacturer of the Best

Oak Leather Belting,

AND FAUGHT'S



Patent Round Braided Belting,
301 & 303 Cherry Street, PHILADELPHIA.



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The Iron Age.

New York, Thursday, July 22, 1875.

DAVID WILLIAMS - Publisher and Proprietor.
JAMES C. BAYLES - Editor.
JOHN S. KING - Business Manager.

New York, January 2, 1875.
Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 34 cents. Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

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The "Interchangeability of Parts" as a System in Manufacture.

In 1826 Thomas Blanchard was granted a patent for a lathe for finishing the barrels of muskets, including their irregular portion next the breech. When set up at Springfield, a stock maker remarked to one of the grinders, "your trade is spoiled, but Blanchard cannot make a lathe to turn 'gunstocks.'" The remark was a challenge, and it was not long before Blanchard had a lathe for turning the gunstocks also. In looking back over the history of mankind, we find that a revolution in the mechanic arts is a very rare thing, especially one that takes place within the space of 50 or 55 years. Yet these two machines revolutionized the manufacturing industry of the

world within the life of the inventor. The first step was the production of government fire-arms with perfectly interchangeable parts.

The British Commission, which visited this country in 1853, found that muskets made in each of the preceding ten years were perfectly interchangeable in their parts, so that they could be assembled with as much ease as a musket of the current date, "and as quickly as though they had been English muskets, whose parts had carefully been kept separate." From the government shops the system found its way into the private factories in which fire-arms were made. No sooner was the system fairly understood and recognized, than the sewing machine manufacture was begun. This machine, as an article of commerce, was an impossibility previous to the introduction of the principle of making the component parts of a machine interchangeable. Following the sewing machine, came the machine-made watch, in which accuracy of machine work has very nearly reached its highest point of perfection.

The first cost of manufacturing upon this plan is heavy. The machines for any given operation cost more when fitted up to turn out a given product than it would cost to turn out a small lot of the finished article with the ordinary operations of the shop. Thus, in making a sporting rifle, the first gun turned out by the machines would cost many thousands of dollars, while it could be made by hand for say \$100; but, in making these rifles, 40,000 would be made in one lot, and the result is that they are put into the market for \$40 apiece, and are in every way as good as the hand-made, costing \$100, while possessing the advantage of easy replacement of a broken or worn-out piece. What is true of a rifle is true of every piece of mechanism having any complexity of parts, or composed of a number of pieces requiring any fitting. The system has a perfect application in all branches of manufactures, from a watch to a locomotive.

In the general work of a foundry or machine shop, this system should have a very large place. After deciding upon the style of machine and the details, the first thing is to make the templets, and if it is a work of extreme accuracy, the first set of these are only to be used in producing other templets which, after being fitted with hardened steel wearing surfaces are turned over to the workman. The saving which may be made, for instance, in the fitting of a cylinder to receive its heads, is in both time and labor. Instead of using a machinist to lay out the cylinder, place the center marks of the holes and get it in position under the drill; a well instructed boy puts on the templet, and, if strong enough to handle the castings, puts them on the drill, bores the holes, and completes the job in the time it would require the machinist to get ready to drill a single cylinder. The head work is done once for all, the datum lines, the points from which all subsequent operations proceed, are decided by the machine, and after that skill is not required. The trade of the workman is to know how to run a drill, a planer, a milling machine, or whatever else it may be. The objection sometimes raised against this is that the workman does not become a thorough machinist. This is very true, but in these days, what we want is men who understand the business of running a single machine to the best possible advantage. Then we can give him all that he can do, and expect he will give us a maximum product from a given machine. It is in the end an advantage to both workman and employer. In making a machine, say a steam pump, more than three times as much work can be done where all the parts are exact duplicates and made by templet, as by the old method. In some shops where steel bushed templets are used for all work going on to the drills, common laborers tend the machines under the supervision of a foreman. A little more care is needed in the preparation, but this is more than compensated by the saving of time and labor in finishing.

The greater part of the small power steam engines in use in this country are built to gauge and templet. Each part is a duplicate of all others of the same kind, and the indiscriminate mixture of the parts from a dozen engines would not give the mechanic any difficulty in the setting up. Repairs are cheap and easily made. The machines, therefore, have a market vastly wider than they would have if built on any other plan. This system is susceptible of a much wider and more general application than it has yet been given, and in many trades which still retain the old method of fitting the parts of each finished article separately, the interchangeability system might be adopted with great advantage. We shall have more to say on this subject in future issues.

Protecting White Labor against Negro Competition.

We learn from our Southern exchanges that the following petition is circulating among the workmen in the neighborhood of Atlanta, Ga. and receiving a great many signatures:

We, the undersigned mechanics and working men, appreciating the difficulties that beset us on every hand, and which, through the cupidity of certain proprietors, contractors and capitalists, whose greed of gain would force us into hopeless poverty, and thus virtually enslave us and our children forever, hereby, individually and collectively, pledge our sacred honor that, from and after this date—

1. We will not deal with, in a business way, or support for public office, any man or men (whether grocer, dry goods, provision or other dealer) who oppresses us by employing negro instead of skilled white labor.
2. We will not trade with any retail dealer who purchases his supplies from a man or men who employ negro labor to the exclusion of skilled white labor.
3. We will not rent a house or houses owned by persons who employ negro to the exclusion of skilled white labor in their construction or repairs.

Freely paraphrased, but without losing its true meaning, this pledge might be made to read as follows:

1. We will not deal in a business way, or support for public office, any man or men, (whether grocer, dry goods, provision or other dealer), who employs cheap labor in his business. As consumers, we prefer that he should pay higher wages to clerks, porters, truckmen, etc., of our own color, than would secure the services of equally efficient negroes, and are willing to pay more for our food, clothing, etc., and to support the idle negroes by paying increased taxes.

2. We will not trade with any retailer purchasing his supplies from the wholesale merchants who do business at least cost, and insist that all who enjoy our patronage shall deal only with those who pay high wages to white men for services that negroes would render equally well and cheaper.

3. We will not rent houses that are built or repaired by any but the highest priced mechanics, although we could rent for less money equally comfortable houses built by negro mechanics.

In a word, the white mechanics of Atlanta and vicinity, in their anxiety to protect what they consider their interests as producers, have quite overlooked their interests as consumers and taxpayers. Supposing it possible for them to observe this foolish pledge in their daily intercourse with the tradesmen and house-owners with whom they deal, they would have the satisfaction of knowing that they were rendering it impossible for the latter to do business economically, and that the difference in the cost of colored and white labor was so much added to the cost of everything they eat and wear and to their annual house rentals. Now let us see what sentimental satisfaction they would receive to offset this serious practical disadvantage. They are unwilling to admit equality between the races, but by this pledge they are seeking to force white labor into places now filled, or which may be filled, to the satisfaction of employers, by negroes. This is protecting white labor in a most extraordinary fashion, and the pledge furnishes a very good example of the methods of reasoning by which the average workman arrives at a conclusion.

"Economy."

The danger of carrying economy too far has already been considered with some care in these columns, and we are glad to see that we are not alone in combating the popular delusion that, by reducing our consumption to the minimum of our requirements, and denying ourselves all luxuries which can be dispensed with, we are going to promote the return of better times. The Chicago *Inter-Ocean* takes the correct view of the case in the article from which we make the following pertinent quotation:

"Economy, economy!" "That's what is going to bring us out of the present trouble. That's what is going to bring us to specie payments and put a gold dollar in every man's pocket instead of a depreciated paper one"—and a lot more of such twaddle.

But we think there was never a greater delusion than the notion so often expressed that the economy of living is increasing the wealth of the country. To illustrate this, let us suppose that the \$2,000,000 of families in the United States so economize their expenditures in the next year that the cost of entire living shall be \$50 less in each case. This would seem to be an addition of \$400,000,000 to the nation's wealth. But is it so? Let us see. The only way that a family can save \$50 is by consuming that much less of something. It may be in food, or clothing, or in luxuries; but in whatever it is, it diminishes the sale or hire of these articles by that amount, and if it diminishes the demand for these articles, the loss must fall somewhere. Let us suppose, for instance, that this \$400,000,000 of imaginary saving were made by the consumption of less tobacco and the diminished use of carriages and horses. Would not the loss fall on the tobacco growers and manufacturers, and on the lively stable men, the carriage manufacturers and all their army of workmen and employees, and would not all the proprietors in these lines of business fail, and would not the cessation of demand for the articles used in making carriages effect other business interests and make losses in an endless variety of ways? Or let us suppose the economy is in the use of coffee. Would it not cause immense failures in that trade in various parts of the world, and

the effect of these failures be reflected upon our own country in the loss of trade with those parts of the world? Or let us suppose it is in the use of lumber. Would not the surplus stock of lumber in this country be so reduced that those who had paid for the labor to manufacture the lumber be ruined, and would not all their employees be idle until the surplus stock was used up? The fact is, that the diminished demand for anything which custom has brought into general use must diminish the demand for labor, and thus the loss in this economy falls heaviest at last on the laborer, but from him is reflected on the retail trader, and from him again to the wholesaler, and so on around in an endless succession of reflections until it has produced general depression in industry and trade.

No one who thinks for a moment can deny the force of this simple and logical reasoning. The only economy which can do us any good at this time—or, indeed, do us other than serious harm by indefinitely prolonging the industrial and commercial stagnation—is economy in manufacture and all departments of production. Economy of consumption, which means denying ourselves conveniences and luxuries which we can well afford, merely because everybody else is doing so, will only lead us further and further away from national prosperity.

The Decline in the Value of Quicksilver.

The decline of nearly 50 per cent. in the value of quicksilver during the past six or eight months, in consequence of its increased production in California, and the removal of the seat of hostilities in Spain to the north and southeast, has attracted general attention. In no other part of the world has cinnabar, the common ore of quicksilver, been found so widely disseminated as in California. Until the discoveries in that State, the market depended almost wholly upon the old Almaden, of Spain, and the Idria, of Austria, for this important requisite in the collection of its metallic wealth. The old Almaden quicksilver mine, in La Mancha, Spain, as is well known, was worked seven hundred years before the Christian era, and is still producing more than any other outside of California. The amounts produced by the Almaden mine were:

From 1534 to 1646.....	Span. cwts. or quintals.
1534 to 1571.....	540,000
1571 to 1583.....	429,560
1583 to 1595.....	460,148
1595 to 1607.....	1,430,003

Average production during 379 years, 5126 cwts., of 101½ pounds of our weight each, and reducing the whole to flasks at 76½ pounds each, it will be seen that the annual production up to the commencement of the present century had been 6800 flasks on an average. The Idria mines of Illyria were discovered in 1497, and from 4000 to 5000 cwts. annually, gradually rose to 12,000 to 16,000. The Huancavelica mines, of Peru, produced from 1570 to 1713, altogether 778,089 cwts., and then gave out.

Spain in 1870 exported 81,136 cwts., equal to 41,311 flasks, the total increase during the preceding five years having been 55,000 cwts. The monthly production of the State of California had reached a year ago something like 3100 flasks of 76½ pounds each, toward which the various mines contributed as follows:

New Almaden.....	1,600
Redington.....	600
New Idria.....	600
Other mines.....	300

being 37,200 flasks per annum, of which about one-half was exported. In 1871, there were produced 31,881 flasks, against 29,546 in 1870, and they were distributed as follows :

To New York.....	800
To China.....	7,900
To Mexico.....	3,081
To South America.....	3,300
To Australia.....	1,100
And to other countries.....	124
	13,905

The remaining 16,676 flasks were retained for the consumption of California and Nevada. Since the enormous development of silver mining in Nevada, the amount exported had been gradually falling off, as the following figures will show:

EXPORT OF QUICKSILVER FROM CALIFORNIA.			
1852.....	Flasks.	1863.....	Flasks.
1852.....	900	1863.....	26,014
1853.....	12,737	1864.....	26,927
1854.....	20,963	1865.....	43,469
1855.....	27,165	1866.....	50,287
1856.....	23,740	1867.....	28,853
1857.....	27,263	1868.....	44,506
1858.....	34,148	1869.....	54,415
1859.....	3,399	1870.....	13,788
1860.....	9,448	1871.....	15,305
1861.....	35,995	1872.....	13,098
1862.....	35,747		

This shows a total export during the 21 years of 495,060 flasks, or, on an average, 23,574 annually. The total product of the mines since they were first opened, including last year's yield, which was 34,154 flasks, aggregated 683,979 flasks, or, at 76½ pounds each, 62,324,393 pounds, an average of 29,740 flasks during 23 years. The total profits made at the mines were the following: 62,324,393 pounds selling, or assumed by the combined mine owners, at an average of 50 cents, gold, each, \$31,162,196; 62,324,393 pounds costing, on an average, 26 cents, \$16,204,343.18 profit: \$14,957,853.82, gold. The price in this city in 1874 averaged \$137¼, gold, or about 87½c. higher than the average price for 23 years. That price was, taking

into account the value of exports and that consumed on the Pacific coast, 50c., gold, per pound. This would represent an extra profit in 1874 of \$2,286,183, gold; less freight, \$13,460, gold, or an extra net profit of \$5,166,388, gold, from 1871 to 1874, both included. Divided among a comparatively few, these were enormous profits in the short space of four years, but they are only part of the real profits, as the figures of gross value of quicksilver sold and cost of extraction stand thus:

Total value of quicksilver.....	gold, \$9,995,390.94
" cost.....	" 2,459,076.36

Net profit for four years.....gold, \$7,536,304.60

This shows that for every dollar expended the owners of the mines have taken in over four dollars, which amount has come out of the pockets of the miners, mine owners, &c., throughout the world.

The Rothschilds, who have absolute control of the Almaden mines in Spain, under a lease and grant from the government of that country, perceiving toward the close of last year that the Carlist armies would be unable at any time to threaten La Mancha, and thus hamper the production and transportation of quicksilver, began to reduce the price, which has continued declining ever since, till it reached £11 per flask, where it seems to have settled for the moment. The fall was precipitated by the news that the California mines were turning out unusually large quantities, and prices have dropped to \$50 per flask at San Francisco, or 70c., gold, per pound in smaller quantities, while here we remain quiet at 75c., gold. Since then news has reached us that in Mexico also important discoveries have been made at Huizucoc. The latest report to hand from these mines is dated February 16, when they had been worked four months, and turned out altogether 450 cwts. From all appearances some time will elapse ere quicksilver can materially recover from the depreciation it has thus far suffered this year.

Some Nonsense About Pipes for Water Service.

The *Journal of Commerce*, of this city—a paper which seldom admits nonsense to its usually well conducted editorial columns—has lately favored its readers with a treatise on service pipes, which is so full of mischievous errors that we wonder how it could have found its way into the columns of any newspaper. As it is more likely to be copied, however, than an article written with reference to the actual facts of the case, for the reason that a great many people would like to have the public believe the statements it makes, we will do what we can to contradict its misstatements:

In former years there was a great hue and cry against lead pipes. Of this we hear nothing just now, although lead is the principal metal still used in the manufacture of water pipes. The public distrust seems now to be shifted to iron pipes galvanized, or coated with zinc. Several correspondents mention instances where the use of this sort of pipe caused a disagreeable taste in the water flowing through it. Seth Green is quoted as authority for the statement that trout are sometimes killed by the supply of water to a pond through a pipe of this description. Notwithstanding these testimonies, we reiterate our assertion that no harm can come to the drinker from water delivered by a galvanized pipe, if the pipe is properly made. We do not undertake to settle disputes between the galvanized pipe manufacturers. Their products differ much in quality, no doubt, ranging under the heads of best, second best, and worst. But we maintain that a thorough, thick coating of pure zinc in an iron pipe presents nothing out of which ordinary drinking water can produce anything injurious. Saline or acidulated water might develop an unpleasant taste in passing over a zinc surface, but Croton water is not known to cause that effect. Galvanized pipe is now gradually supplanting lead on account of its greater cheapness. In some cities it is very generally used, and not until recently have we heard allegations against its innocence as a medium for water. The peculiar taste which some people notice in water so delivered may, perhaps, be traced to the contact of the fluid with the iron direct—the thin zinc coating having worn away. This might impart a slightly chalybeate flavor if the water had been left standing in the pipe for some time. If there is any further doubt on this subject, the oldest and best houses engaged in the galvanized iron trade will be able to convince the sceptics upon application in business hours. Some years ago the public were invited through the newspaper advertising columns to consider the claims of tin lined pipe, but we have heard nothing of this remarkable invention lately. Several New York chemists certified that under no circumstances could water produce injurious compounds with metallic tin; and we presume the same persons would say so much for the zinc deposits in iron pipe, if consulted professionally. This topic concerns the public health. We cannot be too accurately informed about it, and are glad to see the people stirring it up.

This sounds to us very much like willful and malicious advice to the readers of the *Journal of Commerce* to poison themselves, or allow themselves to be poisoned by others. Possibly some persons calling themselves chemists might be induced to say that the compounds of zinc with water are as harmless as those of tin, and it is probable that the same persons, when "seen," could be induced to certify to almost anything. Tin and its compounds are harmless, and zinc and its compounds poisonous. This is no more a matter of opinion than the question of the relative hardness of the two metals. The statements of all the chemists in the city will do nothing toward making the zinc salts harmless. Croton does act upon

zinc, and in an energetic manner. The amount of zinc taken up by the water has in many cases within the range of our own experience been sufficient to cause illness. The symptoms produced were in every case characteristic of zinc poisoning.

If the peculiar taste in water delivered from zinc lined pipes is due to contact of the water with the iron, we would like to know what gives the water from a zinc lined cooler its peculiar taste after standing some time therein. What iron is the water exposed to in that case? The author says that galvanized pipes have been extensively used in some cities, and not until recently "have we heard any allegations against its innocence as a medium for water." If his reading is as limited as his knowledge of the subject upon which he writes, it is to be wondered how these allegations ever came to his notice. It is very true that galvanized pipe has been used for a long time, but from the first it has been a cause of complaint. People in some sections of the country have been badly poisoned by such pipes, and as their use increases we shall have more of it. There are a few localities in which the water is of such a character that zinc is not attacked by it, but these are very few and are well known. And yet a newspaper with a reputation for intelligence ventures to assert "that no harm can come to the drinker from water delivered by a galvanized pipe, if it is properly made."

The only proper way of making a galvanized pipe of this kind, then, is to omit the zinc from the inside. It is all nonsense to talk about "properly made pipes." The idea of maintaining that a thick coating of zinc presents nothing out of which ordinary drinking water can produce anything injurious is an idea so absurd that if it did not peril human life, it would be immensely funny. It is one of those cases in which an opinion is worth nothing at all, especially when it conflicts with what is definitely known. There are many other errors and misstatements in the article, but they carry with them the evidence of their absurdity, and we scarcely need to waste space in calling attention to them.

Latest files of English papers report a very general improvement in the prospects, but very little improvement in the condition of the iron industry. At Darlington there was more activity in pig iron, though at lower prices and with large stocks still on the market. In Wolverhampton the iron makers are hopeful. Coal has declined, and at present prices of fuel iron can be made at a profit, but the benefit of the reduction has not yet been felt by the iron trade. At Birmingham the hardware trade was restricted, not so much by the shock given to credit by recent failures as by the approach of the quarter's end and the midsummer stocktaking, and to some extent, perhaps, the expectation of a fall in prices with declining coal and iron. The factories and workshops, however, were for the most part in full operation, as there are in many branches considerable arrears of orders to be executed before the holidays. This is especially the case in the brass foundry, edge-tool, tin plate work and hollow ware trades. On the other hand, the wire drawing and gun trades are depressed. Advances from other districts have a hopeful tone, but when the actual state of the markets is given, it appears that the improvement is rather prospective than present.

The Transmission of Power by Compressed Air.

BY EDWARD J. HALL, JR., PH. D.

As a rule, power is obtained directly by generating steam, natural and transmitted forces being rarely utilized. Wind and water, once so important, have, in the reaction attending the introduction of steam, received less consideration than they deserve. The old-fashioned wind mill is rarely seen, and its disappearance is by no means to be regretted, for, on a large scale, it was cumbersome, weak and unreliable, but its modern forms are still for some kinds of work very cheap and serviceable.

The trouble with water-power is that while a fraction of what is now wasted would supply all our manufacturing, it is often inaccessible, and so many considerations beside power determine the value of a mill site that we have accustomed ourselves to overlook many available streams. If, by any system, we can transmit power to a long distance, many such forces, now worthless, would be utilized. Water-power is occasionally transported and used directly, but this is costly and of course only feasible in exceptional cases. There are two sets of conditions under which power may be advantageously transmitted: one in which natural forces can be rendered available in no other way; the other, that in which public safety or convenience is opposed to the independent local generation of power. The ordinary use of steam, especially in large cities, is wasteful and dangerous in the extreme. Very many of the engines being small and used, perhaps, but a part of the time, skillful engineers and firemen are considered too expensive, and persons are employed who are

cheap, because ignorant, but economy in wages is dearly purchased at the expense of oil, fuel, machinery and even life itself, for it is a fact that in this country alone about one person is killed or wounded every day from this cause.

Inventors have sought to improve matters by obtaining a safe prime mover, by improving boiler construction and by transmitting power. Hot air engines are good enough for a moderate power, but the size and strength required are fatal objections to their common use.

Electro-magnetic engines have a high efficiency, but their fuel is too expensive—we cannot afford to consume metals. There are objections to almost every form of patent boiler, cost usually being the great one. No type yet introduced has met with general favor, and none which does not combine cheapness with other advantages will ever, to any extent, supersede the common forms. Neither government laws nor moral considerations can control this matter—it is a matter of business; the steam user desires safety, but must have cheapness, and the deadly record of explosions shows how small a margin aggressive economy leaves to conservative safety.

The water engines have a good efficiency, and leave nothing to be desired on the score of safety; but very few cities have sufficient water pressure to be of much service; the efficiency of conducting pipes, valves, &c., is very low, and there are many other objections to their use.

What is known as *Hirn's* *teledynamic cable* furnishes means for the successful transmission of power to considerable distances. The principle is to obtain from a light wire cable a large power by making high velocity compensate for lack of mass. An endless wire cable, carried on pulleys, receives a rapid motion from the source of power, and at the point of application this force is given up through a diminishing train. The inventor estimates that 100 horse-power would furnish 75 at a distance of six miles, the cost (including terminal machinery) being about \$5000 per mile. This system is simple, easily constructed, and adapts itself to all irregularities of surface. For large power and long distances it will probably never be used, but for distances less than a mile, such as between the different buildings of a manufactory, its advantages are undoubtedly great.

All of the systems which do not use compressed air as the medium for transmission are limited in their application by unalterable conditions, but compressed air adapts itself to any and all circumstances; no distance is too great for it, no power too enormous; it can be sent in any direction into the depths of the earth, over the tops of mountains, across rivers or under the busy city streets, always ready to perform its work safely, quietly and surely. Its use is no longer an experiment, for its success has been repeatedly demonstrated in the construction of such great works as the Mont Cenis, Hoosac, Nesquehoning and Sutor tunnels, as well as in a host of smaller enterprises. "Keely's motor" being still private property, we are not yet able to carry around a vessel filled with "cold vapor" at a pressure of 20,000 lbs., and old-fashioned skeptics who cling to the notion that all mechanical energy is derived from heat in some form, are obliged to use cumbersome and expensive apparatus to generate power. Its direct production has, consequently, never been feasible in most forms of underground work, and its transmission from some more or less remote source has been absolutely necessary. Compressed air in these cases has been the only successful resource, and, even were its loss of power very great, the trial takes the shape of machine vs. hand labor, in which contests the former almost invariably triumphs. An accurate estimate of comparative expense at one of the Lake Superior copper mines gave these results: Cost of breaking 1035 tons of rock by hand drilling, at \$1.055 per ton, \$1071.48; cost of breaking 1941 tons by air drill, at \$0.837 per ton, \$1624.84; leaving a balance of 19.8 cents per ton in favor of the use of compressed air. If the air could have been compressed by water-power, the difference would have been much greater; but steam had to be used, and fuel cost \$8 per ton.

There are very many districts on the Pacific coast and in the Northwest where coal is poor and costly, and water-power, though abundant, often inaccessible. It would be, in such cases, both cheap and profitable to use the power at the most convenient point for compressing air. This may be carried by many miles over any sort of country. At Brunswick, Maine, a water wheel condenses air enough to supply several engines operated in different parts of the village, and there would be great economy, convenience and safety in applying a similar plan to large cities. There is no reason why power should not be furnished in service pipes, just as gas and water now are. There are, in every business locality, a host of small engines, many of which run but a small part of the time, each requiring a boiler and attendant, with all the resulting danger and loss from careless work and improper firing. One compressing engine could furnish power for a very large number of establishments, and the various engines supplied would require no attention except to turn the air on and off and occasionally oil the bearings. The minimum of cost would be reached by employing the best skilled labor to run the compressing machinery, and a single engineer could, by taking indicator diagrams, &c., supervise the whole system of engines and keep them all in repair and the best working order. The power supplied to each engine would be measured and paid for only as used. The compressing engine could be comparatively small, for, having suitable storage room, it could run day and night. The power thus stored will keep indefinitely; the receivers at the Mont Cenis tunnel were once left full of air for nearly a month, and the loss was only one five-thousandth of the daily supply.

With such a motive power it would be very easy to extend this system into private houses,

and introduce cheap machinery for operating elevators, sewing machines, &c. This air, in expanding to perform work, becomes very cold, and incidental advantages, such as cooling rooms and promoting ventilation, at once suggest themselves.

Possibly some will consider such a plan visionary, but it is not at variance with any natural laws, and its use in similar ways for years demonstrates that it is perfectly feasible. Fifty years ago many of our present every-day applications of practical science would have been considered absurd and impossible. It has been found practicable and desirable to furnish our dwellings with light and water from central sources, the district telegraph connects every house with a system designed for mutual convenience and protection, and it is not at all unreasonable to advance a step further and distribute power in the same way.

This system will never economically supply large manufactory running continuously, unless water-power is used for compressing, because there are great losses necessarily involved, but these losses would, in the case previously discussed, be more than balanced by other considerations, to some of which reference has been made, while others will suggest themselves.

The distance to which power is carried is comparatively unimportant. Air compressed to 60 pounds and carried for 25 miles, with a velocity of ten feet a second, through a clean pipe four feet in diameter, would lose but five and one-third per cent.; deducting this loss, such a discharge would furnish nearly 5000 horse-power per minute. The principal loss occurs at the place of compression, for to secure this discharge of 5000 horse-power an original expenditure of about 8500 would be required, and over 3000 would be lost just as effectively in sending this power one mile as in sending it 50.

This is caused by a loss of the heat generated in compression, and is unavoidable in practice; although theoretically there would be no waste if the compressed air were instantly used. The production and loss of this heat can be illustrated by a very simple experiment with the pneumatic syringe; this is a glass tube with thick sides closed hermetically by a leather piston. At the bottom there is a small cavity in which a piece of tinder is placed. The tube being full of air the piston is suddenly plunged downward; the air thus compressed disengages heat enough to ignite the tinder which burns when the piston is rapidly withdrawn.

The exact amount of the loss due to this cause is readily determined by a few simple equations, which need not here be given.

In general, we may conclude that air compressed to from 75 to 100 pounds, and distributed from a central point to a number of consumers, would yield, in actual service, about one-half of the original expenditure of mechanical energy.

(We give Mr. Hall's article as written, but do not fully agree with his conclusions. In certain cases the waste of power has been stated to be as low as 25 per cent. with a possible margin of 5 per cent. to be saved under favorable conditions.—Editor of *The Iron Age*.)

Emery Grinding.

In the consideration and discussion of processes for converting material, and the various conditions which attend on the operation of machinery, it is a common thing to hear people say, "Give us precise facts, we do not care about philosophy."

In such branches of science or art to which the term exact can be applied, there is no question as to the great reliance which may be placed in crucial experiments and tabulated results.

There is, however, a great share of what may be called manipulative processes in manufacturing; working iron or wood for example, in which crucial experiments can never be placed as an authority against general results, and the most reliable deductions are formed by what the late Mr. Buckle termed "generalization." A repetition of results is dependent upon constant causes and upon uniform conditions, two things, or rather one thing with two names, which manipulating processes do not generally supply. It may be proved that under certain conditions a cutting tool will displace 10 lbs. of cast iron in an hour, consuming in the operation one horse-power, or that 10 lbs. of cast iron can be cut away with emery wheels at an expense of so many shillings and so many pence cheaper than the same amount of displacement can be performed with edge tools, yet there may be wanting certain elements which are essential to fix a true value on the performance. Experiments are seldom without value, and on deductions drawn from such premises no small share of engineering knowledge is based, but if a person is to arrange a workshop and provide tools and power for cutting and shaping cast iron, more reliable standards must be looked to; in other words, a large number of experiments under the name of general practice are rather to be followed.

This, of course, is only contending that a great number of unrecorded and uninvestigated results may convey general ideas to be relied upon rather than a single or a few experiments carefully conducted, and that conditions are so various that nothing but the most extended experience can embrace them.

These remarks are set down as preliminary to some notice of emery grinding in metal working, a subject which has engaged a great deal of attention during a few years past, but has not, so far as the writer knows, been carefully investigated as to the precise results which may be attained by emery cutting on soft iron or steel.

The rapidity with which a new invention may become known and adopted is dependent upon

many conditions, generally and mainly, no doubt, from real utility, but sometimes from novelty and advertising; and success in one class of operations generally leads to applying new inventions in other and different operations where it cannot succeed. As to the important and useful results which have followed the general use of emery grinding appliances for the treatment of hard material there is no longer room for opinion. It has rendered possible one of the most important improvements in modern engineering practice, the employment of tempered steel and case hardened iron wherever the conditions of use demand such material. Hard materials are treated by emery wheels nearly with the same facility as soft material, and at but little more expense; in fact, the result produced up to certain limits seems to increase with the hardness of the substance ground; and considering how short a time this grinding system has been in coming about, we may infer that it is to extend to many purposes not yet thought of. Files and conservatism both being cheaper in England than in America, have prevented English engineers from proceeding so fast in the emery grinding art, a backwardness which, so far as treating soft material is concerned, they will probably have no reason to regret in future.

The principal expense of cutting and shaping iron in a fitting shop may be divided into the interest on capital invested in tools, the wear or deterioration of tools, attendance and power. Beside these, there are other kinds of expenses, which, although they may not be so apparent to general observation, will, nevertheless, turn up in the balance sheet at the end of a year's business, or, as is sometimes the case, not until after several years' business. Among these latter are the unhealthiness of processes, danger from fire, danger to life from accidents, opposition to innovations, with other things.

The introduction of an emery grinding machine among machine tools for cutting is like introducing galvanic currents through the hull of an iron ship; from the time when such a machine is started, in a fitting shop, or in any part of a works where air currents may carry the flying emery dust amongst machinery, there begins a wear and destruction of running joints, which may not be manifest for a long time, but which may, in the end, destroy more than it is possible to gain by the application of grinding processes.

As to emery grinding machines, the shaping machine for instance, recently illustrated in the American and English journals, destruction of all moving joints begins when such machines are started, and by the time a cutting machine would have come into proper working condition, a grinding machine will be worn out. It is not claimed that by a careful protection of the working parts, a grinding machine may not last for a reasonable length of time, but to leave the joints exposed and to place the greater part of them below the level of the grinding plane, as in the machines referred to, the destruction of running joints is an inevitable result. The pneumatic exhauster which is employed, may, and no doubt does, collect a great share of the floating emery, but surfaces being acted upon must be within sight and accessible to an attendant, so that to completely house a grinding wheel is out of the question.

As to the danger from accidents or from fire, and the unhealthiness of grinding operations, nothing need be said; any opinion given could, no doubt, be combated by "precise facts," yet the popular estimate of the matter among mechanics is after all the safest guide in reference to the danger and unhealthiness of grinding machines, while the effect of these conditions upon wages is such as to prove that the processes are avoided by workmen. The writer has more than once attempted to combine stone and emery grinding with cutting processes in the manufacture of iron and steel articles, and while it is regretted that such data as the experiments afforded were not collected with sufficient care to warrant publication, the general result was to give rise to the opinions expressed in this article; and to warrant a proposition that for displacing or cutting any soft material such as may be cut with a tool movement of 15 feet or more in a minute, cutting is less expensive than grinding, and free from the objections pointed out.

In cutting metal such experiments as have been tried, as well as general experience, all go to prove that the larger and more solid the particles cut away the less the expense of cutting, the expenditure of power, time, tool wear, and other expenses increasing as the chips become small and broken up.

In view of this we can hardly expect to cheapen soft metal cutting by a process which disintegrates the material cut away; it would be contrary to obvious principles, and only possible by assuming grinding tools to have greater endurance and capacity than cutting tools, so that what is lost in pulverizing can be gained in time and tool renewal.

Tracing the development and the success of emery grinding in America during ten years past, the facts, we think, will bear out the proposition, that the success of grinding processes has been in treating material too hard to be cut with tools, and that all attempts to supplant cutting by grinding, especially when the grinding and cutting machines have been employed in the same rooms, have not given satisfactory results.

As mentioned before, it is natural that the manufacturers and dealers in emery wheels and emery grinding appliances should recommend their wares for purposes to which adaptation is questionable. No process is more likely to mislead one in forming opinions than to see a good emery wheel at work on steel or other hard material; it imparts a feeling that cutting, filing, scraping and so on, are mistakes, and that grinding is the true process for cutting and shaping in all cases. Such impressions have no doubt led to the application of grinding in many cases when cutting should have been retained.

It should have been remarked that in preparing surfaces, such as polishing or even in preparing a fit between two surfaces, there is an apparent gain by grinding, even on soft material, but when the extent of such surfaces in ordinary machine fitting is considered, it will be seen that such as may be ground instead of scraped, are not many nor important, and the saving which might be effected by grinding would be more than balanced by the introduction of a new process and the objectionable features of dry emery grinding.

To those familiar with machine fitting of twenty or more years ago, it is well known that emery grinding was a common practice in fitting both plane and cylindrical joints; even at this time it is extensively practiced in the New England States of America, especially in fitting the cheaper class of machine tools, and in what may be called manufacturing as distinguished from engineering practice.

The makers of the better class of machinery have long and persistently contended against emery fitting, as it is called, and have driven the practice quite out of use. Some, though not all of the objections which apply to the use of grain emery in machine fitting, apply also to emery wheel grinding, and should the later process become adopted in treating soft metal, engineers may look to a future crusade against what may again introduce many of the object on attending on the use of grain emery.—J. Richards, in *Engineering*.

The Law of Trade-Marks and their Analogues.

BY ROWLAND COX, ESQ.

VII.

In addition to the common law right of property in trade-marks, Congress has provided for their registration and exclusive enjoyment by statute. The act of July 8, 1870, re-enacted in the revised statutes without material alteration, permits a registration in the patent office upon payment of a fee of \$25 and a compliance with other conditions. The registration does not, however, in any wise affect the legal qualities of the mark, except to enable its owner to proceed in the United States courts. The certificate which is issued by the Commissioner of Patents, is in no sense analogous to a patent. On the contrary, it is without any of the important elements of an exclusive grant. It is not even *prima facie* evidence that the registration has been regularly made.

The case of *Smith vs. Reynolds*, recently decided by Judge Blatchford, elucidates very fully the true nature of existing law, and may be quoted with profit at some length. After alluding to the language of the statute, the learned judge writes as follows:

"In respect to a trade-mark, the statute does not authorize the Commissioner of Patents to issue any letters-patent therefor, or to issue any certificate containing a grant thereof. The only certificate he is authorized to issue in reference to the original registration of a trade-mark, is that provided for by section 50, which enacts as follows: 'The time of the receipt of any trade-mark at the patent office for registration shall be noted and recorded, and copies of the trade-mark and of the date of the receipt thereof, and of the statement filed therewith, under the seal of the patent office, certified by the commissioner, shall be evidence in any suit in which such trade-mark shall be brought in controversy.' A certified copy of the trade-mark, of the date of its receipt, and of the statement filed therewith—that is, a copy of everything filed and recorded, and of the memorandum of the date of the receipt thereof—is made evidence. But such copy is evidence only that what is shown by it to have been filed was filed. The certificate of the Commissioner, that the parties 'otherwise complied' with the act, can not be substituted for the judgment which a court must pass as to whether there was a declaration filed, and one under oath, and one complying, as to its contents, with the statute. The court is to judge from the 'statement' whether the requirements of recording 'the class of merchandise and the particular description of goods comprised in such class, by which the trade-mark has been or is intended to be appropriated,' have been complied with, and whether the requirement of recording a description of the mode in which the trade-mark 'has been or is intended to be applied and used' was complied with. So it is equally for the court to judge whether the requirement as to the filing of the proper declaration was complied with. The general certificate of the Commissioner cannot be taken as evidence on the subject."

Thus, it will be seen, the registration is tantamount only to what the word imports. It is, as it were, the putting on record of the party's right with a description of its metes and bounds.

It will also be gathered from Judge Blatchford's language that unless the terms of the statute are exactly complied with the statutory right is not acquired. As in the case of a copy-right, the court goes behind the seal of the executive and judges for itself whether there has been an omission to observe any one of the steps which are required to be taken in order to confer the privilege. If there has been an omission, even though it be of the least importance, and in the narrowest sense technical, the act of the Commissioner of Patents will be treated as wholly nugatory. Probably three-fourths of the registrations made prior to the creation of the office of Examiner of Trade-Marks are invalid, and will fail of their own weight as soon as tested.

It should not be inferred from the foregoing that the statutory provisions are not of great utility, and highly beneficial in their results. If there be any virtue in recording the evidence of title to real estate there is virtue in making registration of a species of property the value of which is as certain as it is difficult to define. Especially is the statute useful as affording a means of fixing date of adoption, and preventing infringements through inadvertence; in short, as giving notice to the world of the registrant's title. It is safe to state that a large proportion of the suits which have arisen since the passage of the act are to be attributed indirectly to the failure of the plaintiff to avail himself of the privileges it affords.

In respect of the terms of the law it will suffice to state that any lawful trade-mark, that is, any lawful *technical* trade-mark, according to the practice of the patent office, may be registered in compliance with the established rules. The protection remains in force for a period of thirty years, and may be extended indefinitely, subject to certain exceptional provisions in the case of foreign marks.

There is, also, an anomalous act passed in June, 1874, which provides for the entry of labels in the patent office upon payment of a fee of six dollars; but it affords no remedy for infringement and no privilege except that of paying the six dollars. The statute was drawn by a gentleman whose knowledge of law is as limited as his knowledge of all other subjects is remarkable, and it is, consequently, a palpable blunder. It will serve, however, to open the way to effective legislation which will permit a registration of labels and show cards in a manner substantially the same as that now provided in respect of trade-marks.

Other than these two acts, there is no statute law of general application that has any relation to our subject. Statutes are in force in New York and other States, but experience seems to have demonstrated that in so far as they seek to modify the common law, they are of inconsiderable consequence.

At Harrisburg, Pa., on the 24th ult., the new coal machine, the invention of Dr. J. R. Hayes, for pressing coal dust into fuel, was put in operation at the Harrisburg Machine Shop, and a ton of solid coal was made in six minutes. This is the first successful effort made in the United States for utilizing coal dust on a large scale. The machine is alleged to be simple, cheap and universally practicable.

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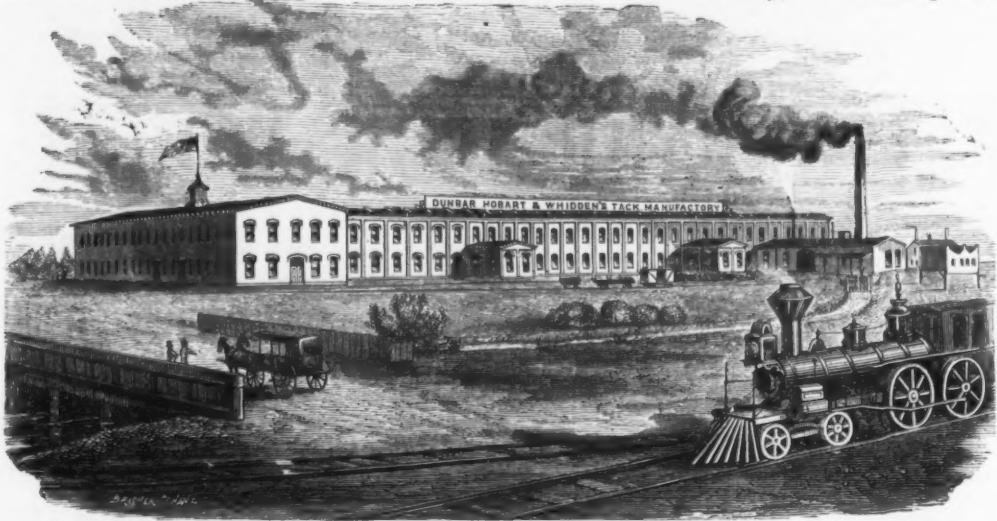
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G. BARRY WALL, M. E.

III.

ROLLING OF THE WIRE RODS.

The billets having been sheared into convenient lengths, are placed in the reheating furnaces, and are there brought to a bright red heat, suitable for rolling. The billet is then passed through the first groove of the roughing rolls—an oval of the first class. Then with the broader side vertical, it is passed through the second—a Gothic square. The Gothic grooves are the most convenient shapes for roughing grooves that can be obtained, on account of the adaptability of that form to any style of groove.

Until very recently it was thought necessary that the billet should be brought down to finishing size with as many passes as was possible while the metal remained sufficiently hot. By means of more rapid revolution of the rolls and greater ratios of reduction, the billet is brought down by at least half the number of passes which were formerly deemed essential to the proper rolling of the rods. In the case under consideration—an 8 inch train—the number of revolutions should be from 460 to 475 per minute, and the number of passes for roughing, 7; and for finishing, 3; making in all, 10.

The third pass is through an oval of the first-class; the fourth, a Gothic square; fifth, an open square; the sixth, an oval; and the seventh, through a Gothic square. At each pass the billet is so turned that the broader side shall be vertical. From this point it is necessary to make at least three passes for finishing. The bar is first passed through an oval of the second-class, then through a third class oval, and lastly through the dead square or plain circular grooves, according as the finished rod is to be square or circular in section. The rod is coiled while hot by means of a circular revolving frame, and is taken at this stage and pointed, preparatory to the operation of drawing.

PREPARATION OF THE RODS FOR THE OPERATION OF DRAWING.

The coiled wire rods are removed to common open forges, where the ends are heated and hammered to points, in order that these ends may pass through the holes in the die plates, sufficiently to admit of their being seized by the grippers. Before drawing it is necessary to thoroughly cleanse the rods, to remove the oxide, and thus prevent the scratching and cutting of the surface of the metal when drawn. Large tanks containing a dilute solution of vitriol are provided for the purpose of "cleaning." The coils of wire are placed in the bath, and allowed to remain until the oxide has been sufficiently removed; the length of time employed being, of course, dependant upon the size and shape of the rod. On being removed from the bath the coils are washed in cold water to remove all traces of the acid. The next stage in the preparation of the rods is the "coating" of the wire. Two kinds of coats are employed in America, viz., the "lime coat" and the "lees coat." The former is given to the metal by immersing it in a mixture of lime and water of the consistency of molasses, and the latter by immersion in a mixture of rye flour and water. The object of both of these is to protect the metal from oxidation, and to facilitate the drawing of the wire. Upon the grade and quality of iron employed depends the character of coating to be given it. Charcoal iron is given the lees coat when the metal is to be drawn down to fine sizes; the same with Norway iron. The lime coat is given to the above kinds of iron when spring wire and wire of great strength and stiffness are required. The rods after having been coated are ready for drawing without further treatment.

ANNEALING.

Wire after being drawn down one or two sizes, must, in order to reduce it further, be annealed, and go through the process of cleaning and coating previously described. Annealing is a process used in manufacture of wire to restore the softness and pliability of the metal, which has been lost by repeated drawing, the metal, by compression, becoming extremely hard and brittle. Annealing consists simply in heating the wire to a low red heat, and allowing it to cool slowly. The operation is carried on in annealing pots, which consist of a cylindrical cast iron pot of a diameter of from three to four feet. The bottom is a cast iron saucer. The top of the pot is flanged so as to receive a lid of the same metal. The whole rests in a vertical furnace set in brick work, the flues being arranged differently, according to the ideas entertained by manufacturers. Direct upward draughts are more largely used than any others.

The action of the process has been explained by many, and the most reasonable explanation seems to be that the particles of the metal assume a different arrangement under these circumstances from that assumed by them when allowed to cool rapidly. Wire, after annealing, has a greater area of section than it has before this process has taken place. After heating the wire or wire rods, as the case may be, up to the required temperature, they are taken from the pots, thrown upon the floor of the cleaning house or department, and allowed to cool slowly. When the wire has been cleaned and coated it is removed to the blocks and reduced further.

An objection to the above described form of annealing pot is, that the metal, at a red heat, combines with the oxygen of the air, forming a thicker coating of oxide than is desirable. To remedy this many different plans have been adopted. One is to place the wire in a box, which is then charged with a gas which will not oxidize the wire when the latter is heated. This will prevent the formation of the scale, and thus obviate the use of the vitriol bath. The vessel in which the annealing takes

place is provided with stop-cocks, by which the air in the interior is displaced, and an artificial gas substituted. Another is by heating the wire in a bath of flux, such as chromate of calcium, hydrate of potash, hydrate of soda, borate of soda or potash, or other similar compounds. The wire, having been heated in this bath to the required point, is taken out while hot. A thin film or coating of the flux remains, which may be washed off with water when cold. The required properties of the fluxes are: 1st. The property of being non-volatile or only slightly so; 2d. Of having no destructive action upon the wire; 3d. Of fusing to a thin mass at a red heat; and 4th. Of being soluble in cold water after fusion. Many other methods might be mentioned, but nothing would be gained. These different plans have all been tested by manufacturers; but either bad results or prejudices on the part of workmen have led them back to the old form of annealing pot and the common furnace with the direct upward draught.

STEVENS INSTITUTE OF TECHNOLOGY, Hoboken, N. J.

Making Steel Pens at Camden, N. J.

Until within a comparatively recent period, all the steel pens used in this country came from England. Now the home manufacture is so well established that it supplies, at least, four-fifths of the demand. As a rule, American pens are better than the English, and they are invariably better than the cheap French and German pens recently introduced. For some time after the successful establishment of American factories, the popular prejudice in favor of foreign articles was so great that the shapes and trade-marks on the best known English pens were generally imitated. That bad custom prevails less and less from year to year. There are, perhaps, half-a-dozen makers in this country who have a trade built up wholly upon the excellence of their own pens bearing their own marks. Another custom that still holds its ground is to stamp pens with the name of stationers who order large lots. The purchaser at retail seeing, for example, "John Smith & Co., Cincinnati" on his pens, imagines that the making of pens is a branch of the business of John Smith & Co., and conceives a high opinion of the enterprise of that firm, which is not at all deserved, since all they had to do with the production of the articles was to order their name put upon them. The best makers are discouraging this practice and maintaining their own trade-marks as much as possible.

Perhaps the most extensive steel pen factory in this country is that of R. E. Terbrook & Co., of Camden, N. J., a firm of English Quakers, who brought to this country a full knowledge of the art as practiced in Birmingham, and from insignificant beginnings have built up a business that employs over 200 hands. They make 150 different styles of pens. Probably a dozen or twenty styles at most afford all the different qualities that can be given a pen, the rest being varieties of form and color designed to please the taste and fancy. New devices are constantly produced, like new fashions in dress, the rivalry of manufacturers making it necessary to attract the notice of buyers by novelties which are merely new shapes with old qualities. The steel used is of the finest quality and comes from Sheffield. It is first cut in strips and softened by heating in iron pots sealed with clay in a "muffle," or close furnace. Next the strips go into an acid bath to be cleansed of dirt and scales, and they are then passed, when entirely cold, through trains of rolls, which bring them down to the thickness—or thinness, rather—required. From these thin sheets the flat forms of the pens are punched by lever machines worked by hand. An expert operator will punch about 400 gross a day. What remains of the sheet is a piece of steel lace-work—valuable enough, however, delicate as it is, to be shipped back to England for reworking into steel bars. The "blanks," as the pens in their first form are called, go through two processes to have the openings cut in their backs and the slits in their sides. Next they are shoveled by the bushel into iron boxes, and go back to the furnace to be annealed—a delicate process, requiring first the right degree and duration of heat. Up stairs again to the marking presses they go when cool, and have the names stamped upon them. The next process is called "raising," and consists in pressing each pen separately in a die to bring it into shape. Another heating operation follows, the pens being put in long sheet iron cylinders, which are turned by hand over a slow fire. This is the important process of tempering, and is rather more critical than annealing. A bath of oil cools the pens gradually. They are then put in galvanized iron drums—partly filled with sawdust—rotated rapidly upon shafts. By contact with the sawdust and with each other they receive a bright polish. More processes requiring separate manipulation follow. Each pen is held against a small emery wheel and ground, first lengthwise and then crosswise. One process accelerates and the other retards the flow of ink, so that the two establish a proper equilibrium. Another effect of the grinding is to give additional elasticity to the metal. Up to this time the pens are useless for writing, the essential operation of slitting the points remaining to be gone through. Each is held under a stamping machine which makes the slit. All then go into the examining room where quick eyes and nimble fingers detect and separate the imperfect. Different colors are next given by another heating process—exposure for a short time to the fire producing fawn color, a little longer bronze, and still longer blue and purple. The bright steel colored pens do not go through this process. A bath in a kettle of varnish and a drying-off over a slow fire completes the pen and it is ready for packing. Just how much a gross of each kind will weigh has been ascertained, so that instead of being counted the pens are thrown into a pair of scales from a little brass scoop until the beam turns. The gross thus ascertained by weight is never a pen short or in excess.

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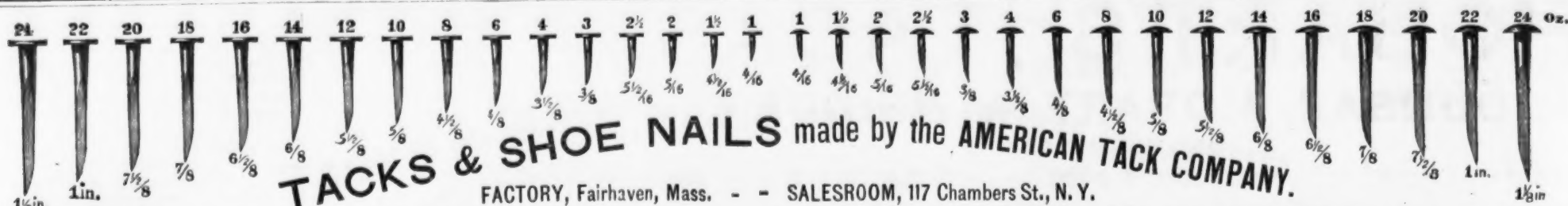
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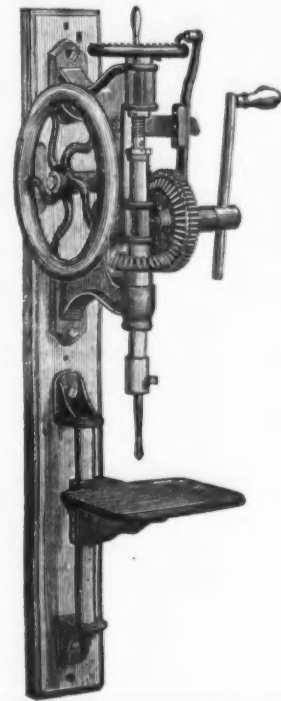
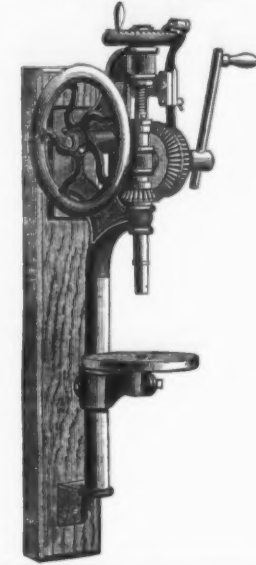
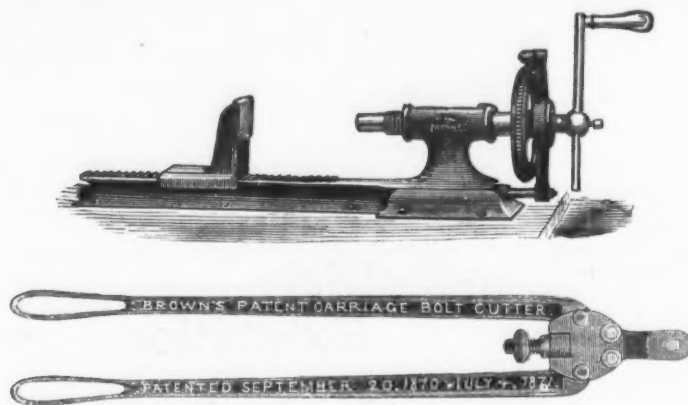
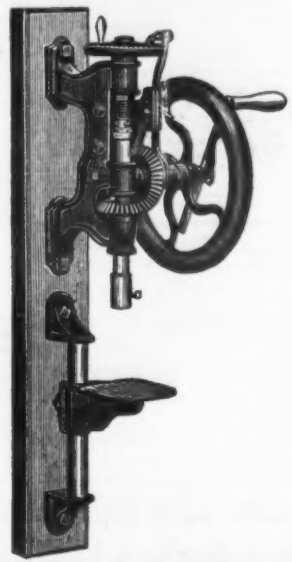
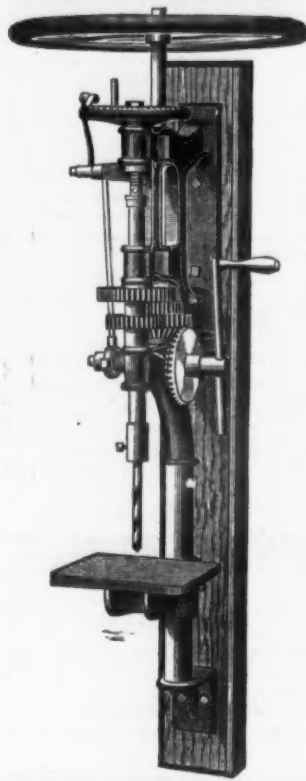
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Lightning and Lightning Conductors.*

(Continued.)

II. ITS EFFECTS.

The effects of atmospheric electricity are, perhaps, better known than those of any other natural phenomenon. They have been principally studied in their destructive results upon ships, upon buildings, upon human beings, and, in our own particular sphere, upon the instruments employed for telegraphic purposes. The case of a ship is very different from that of a building, or an apparatus within a building. A ship is a prominent object, generally a conductor, situated upon a plane—the sea. It thus, if a thunder cloud passes near it, at once reduces the line of resistance between the sea (the inner coating) and the cloud (the exterior coating) of the condenser, determining discharge. Hence it is that so often it has been observed that a heavy black cloud is approaching the ship; and, without any previous warning whatever, a great flash of lightning or an apparent ball of fire has seemingly descended upon the ship, followed at once by an awful clap of thunder. On the other hand, buildings form but an insignificant feature in the large area exposed to induction from a charged cloud. Trees and buildings take but a portion of the charges which in the case of ships have fallen in their whole intensity upon them. Except in the case of very prominent church spires, columns, etc., it is probable that the effects upon buildings are immeasurably smaller than upon ships. Again, in the case of human beings it is probable that but a small portion of the discharge passes through them; while in the case of telegraphic instruments the quantity of electricity which passes through them is still smaller.

From these causes, the methods that have been adopted for protection, based upon the damage inflicted on ships, have probably led to the adoption of unnecessarily costly and superfluous measures to protect buildings and instruments.

We, in this society, are more interested in the effects of lightning upon instruments, and upon the apparatus constructed for the transmission of telegraphic dispatches, though we neither ignore nor neglect its effects in other fields.

The accidents that telegraphs suffer from might be divided into three classes:

1. Those affecting the wires;
2. Those affecting the poles; and
3. Those affecting the instruments.

Each of these classes may be subdivided into those which are the result of the direct discharge, and those which are the result of induction. In the first case the wires, poles or instruments form a path or current for a portion of the discharge itself; in the second place they are influenced by currents which are induced by the approach, meridian, or sudden neutralization of charged clouds.

1. (a) *Direct Discharge.*—The direct effects are not nearly so numerous as the induced. In the case of open wires, the discharge forms but rarely anything more than an instance of the passage of a very powerful and instantaneous current. Cases have occurred, however, where this current was so great as to fuse and destroy the line wire; but such cases are very few and far between.

During the past season I can find but two cases where our line wires—viz., N. J. 8 wires—have been absolutely fused.

(b) *Induction.*—It is evident that the accumulation of a charge upon a cloud converts it into a very powerful inducing body. As the cloud approaches the line it induces in the section of the wire nearest to it an opposite electrical state, and as this change of state is gradual, a current of sensible duration must be observed; but when discharge takes place and the cloud suddenly loses its coercive power, the wire as suddenly recovers its neutral condition, producing a powerful current in the opposite direction. Hence, during a thunder storm, wires are pervaded by repeated currents which ring bells, demagnetize needles, throw ap-

paratus out of adjustment, shock clerks, and make false signals on railway block instruments. During the construction of the Hoosac tunnel, two premature explosions of blasting charges were caused by these currents, producing serious and fatal results.

Not only the over ground wires are affected, but those buried 2 ft. deep underground. I print as an appendix to this paper a very interesting correspondence which took place in the year 1854, between Faraday and Messrs. Latimer, Clark and Culley, upon the demagnetization of needles upon the long underground circuits between London and Manchester, and very recently (July, 1871), while some joints were being made upon the new underground wires between Manchester and Liverpool, the joiner was alarmed by a succession of crackling sparks passing from the wires to his box, which was in contact with the ground.

2. In the case of poles, it has been found that when the pole has formed a portion of the path of the discharge, it has been, in the case of an unprotected pole, shivered to atoms, and one instance occurred where 20 successive poles were very nearly totally destroyed. Usually, however, a discharge, which has taken the wire in its path, divides itself amongst several poles, and cuts out, with the smoothness of a gouge, spiral grooves from the top of the hole to the bottom.

3. In the case of instruments, the effects have been:

(a) *From Direct Discharge.*—Currents of such a strength as to absolutely burst out the cases, burn the woodwork, and fuse the wire of the galvanometers and electro-magnets. An exceptional case of accident has arisen from the wires passing close to gas pipes and the discharge passing across the air fusing the pipe, lighting the gas, and setting the station on fire. Such cases are, however, rare, and have generally occurred at "intermediate" stations where no earth was employed.

(b) *Induction.*—The induced currents being instantaneous and very strong, demagnetize or reverse the polarity of magnetic needles such as those of galvanometers. This was a very prolific source of trouble in former days, but we have recently introduced induced needles which have almost entirely removed the evil. The needle inside the coil deflected by the working current is not a permanent magnet, but a piece of soft iron temporarily magnetized by the influence of permanent magnets outside the coil; but even these external magnets are sometimes demagnetized.

III.—PROTECTION.

I will now discuss the measures that have been adopted for protection from this destructive force.

1. As regards ships, the method adopted by the great authority, Sir William Snow Harris, has proved itself to be so efficient and perfect that no improvement has been required; nor can any be well suggested. Accidents to shipping have almost entirely disappeared; fishing smacks and small coasting ships are occasionally injured, but we never hear of an accident to the ships of our navy, or rarely to those of our merchant service. Such vessels as have been struck have been invariably unprotected.

2. In the case of buildings, however, there is much room for improvement, not only in the form of the conductor used, but in the extension of its adoption. The heavy cost of a system similar to that used for our ships, has probably had a serious influence in checking the employment of such protectors. I have known men pay from £40 to £50 for protecting their houses; but, as I contend, most unnecessary expense has been incurred in such cases. I hope to show that it is possible for a man to render his house as absolutely safe as a ship has been made, at an expense which may be considered trifling.

It must not be forgotten that a chimney lined with a thick layer of soot, up which a current of heated air and volumes of smoke are ascending, and terminated with a mass of metal (the grate), is an excellent but dangerous conductor, for it ends in the room and not in

the earth. Hence so many indoor accidents, and hence the duty of every householder, particularly in exposed positions, to protect himself and his family.

The conditions that determine a perfect lightning protector are:

1. That it shall expose in some prominent position of a building a metallic point, and that it shall offer from this point to the earth a path of little or no resistance to the passage of the current. Hitherto, in accordance with the directions of Sir William Snow Harris in his application to ships, heavy copper rods, ropes, or plates of great expense, have been used; but I contend that a wire equivalent to the ordinary galvanized iron wire, known as No. 4, which is one-quarter of an inch in diameter, and used so largely for telegraphic purposes, is amply sufficient for any dwelling house. The use of such an immense conductor is as though a man built a tunnelled sewer, where a small drain pipe would do. My reasons for recommending telegraphic wire are these—when telegraph poles were first erected in this country, they were protected with lightning conductors made of No. 8 wire, led into a groove in the pole, and terminated at its upper extremity by a point. This practice was subsequently found to be expensive, and it was thought, to be unnecessary. It was therefore abandoned, but at a later period it appeared that these earth wires or conductors were found to effect a very marked improvement in the working of circuits by removing the contact that occurred in wet weather between two contiguous wires. They caused the leakage from each wire to pass harmlessly to earth. Hence it is that on all our trunk lines poles are invariably supplied with these earth wires—not as a protection from lightning, but as a means of removing the disturbing contact that arises on badly insulated lines during wet weather.

Now, it is a fact worth recording that a case of a pole so protected being damaged during a thunder storm is not on record; whereas scarcely a thunder storm occurs without some unprotected poles being shattered to pieces. On examining a line of poles that extended from Basingstoke to Andover, upon the London and Southwestern Railway system, 15 per cent. of the poles were found to have been so struck. This line was renewed, and earth-wired, and since then not one single case of damage has occurred, although many years have elapsed.

Several poles have recently been discovered which were considerably shattered for the first few inches of their tops; but from the point whence the wire proceeded to the earth, the poles were found to be thoroughly intact, the charge from that point passing harmlessly to earth through the wire. The cross-arms which are used for the support of the insulators and wires, are frequently found to be damaged as far as the earth wire, never beyond. Indeed, cases can be multiplied *ad infinitum*, where the No. 8 wire has been found sufficient to carry off the discharge harmlessly to earth. Moreover these wires unquestionably act as lightning protectors, for upon those lines which have been earth-wired, the damage to apparatus has been small in proportion to those which occurred on lines not so protected. Hence I consider that I am justified in saying that No. 4 wire, which is twice as massive, and offers half the resistance, is amply sufficient for the protection of such buildings as do not very greatly exceed our poles in height. I refer more particularly to dwelling houses. However, as the height of buildings increases, and as we attain such heights as those reached by tall chimneys, chimney and church spires, larger wire than this would be advisable. Stranded wire from its greater pliability is preferable to solid wire. I can conceive no case where $\frac{3}{4}$ inch stranded galvanized iron wire is not ample.*

The following precautions are necessary in fixing conductors to houses:

1. The conductor must be solid and continuous from its gilded or plated point to the ground, i. e., there should be no joint unless it be a well soldered one in the whole of its path. Chains and link rods,* which were used in the earliest forms of conductors, should be strenuously avoided, and where existing, at once removed. Indeed, every investigation has shown that where damage has occurred to buildings protected by so-called lightning conductors, chains, linked rods, or other imperfect conductors have invariably been used.

2. Its connection with the ground must be sound and good; in fact in the language of the telegraphist, "it must make 'good earth.'"

It may be connected with the iron gas or water mains; or be buried several feet in coke, or attached to metal buried in moist earth, or be carried down a well.†

3. Each conductor—if there be more than one—should make a separate earth if possible, and they should be all connected together, either above or below the surface. The lead roofing, and all external masses of metal in the line of probable discharge should be connected with them. They should be periodically examined, not only to see that their points remain intact, but that the metallic continuity is perfect, and that they continue to make a good earth. The only effectual test of such perfection is to be made by testing their continuity with the galvanometer and current to see that they offer no resistance. The custom now is to fix them, and then to leave them to chance! They are never examined. An instance has been brought to my notice in the Island of Jersey, where the lightning protector of a church was found to be broken off at a distance of 2 feet from the ground, and had been so for years; and the celebrated statue of Scott, in Edinburgh, was seriously damaged, owing to some mischievous person having removed the part which made connection with the ground, out of its receptacle. The practice adopted by many people to insulate these conductors, is evidently unnecessary, and it is equally absurd to carry them externally to their disfigurement—in the case of church spires, columns and chimneys. It is, however, better to carry the wire externally in the case of dwelling houses, lest they pass too near to the lead gas pipes, which, being themselves good conductors, and soft metal, might be fused.

It is also assumed by some that electricity objects to go round a corner; and it is therefore urged that corners should be avoided; but it is evident, from the known laws of electricity, that this is an unnecessary restriction. The only point which one has to guard against is that there shall be no points or acute angles in the conductor, lest branch circuits be determined; hence the straight and more direct its course to the earth the better.

The area protected by the conductor is a matter of much consequence, and it was said by a committee of the French Academy that this area should have a radius equal to twice the height of the conductor from the ground; but cases have occurred, owing to the bifurcation of the discharge, where buildings have been injured at a distance considerably less than this from a conductor. Hence it is thought safer to take the radius as equal to the height of the conductor. Thus, for small houses, one conductor is enough, but it is safer to attach one to each stack of chimneys. If it project a yard beyond, it is sufficient, for then it is within easy reach of inspection; a matter of some consequence when the principal function of the conductor depends upon the point with which it is surmounted being kept intact.

It is thought that with 30/ for materials and 10/ for labor, any intelligent man can, with these directions and precautions, safely protect his house from the destructive effect of thunder storms.

I have recently had the pleasure of inspecting a plan adopted by Mr. W. H. Hyett, of Painswick House, near Stroud, Gloucestershire, by which he has succeeded in converting a 2 inch wrought iron pipe, used for the ventilation of the drains of his house, into a very effective lightning conductor. The wrought iron pipe is carried from beneath the ground to a point 8 feet above the top of the highest chimney. It is there surmounted with a vane having a sharp point some inches above its center, the vane and the point being of copper. It is also connected with the lead coating of the roof. It appears to me to be an excellent and admirable system, worthy of greater adoption.

We will now consider the methods adopted to protect our telegraphs.

I have already pointed out that the system of earth wiring poles has given us an excellent protector, but in addition to this most of our large stations are approached by gutta-percha wires in iron pipes under ground, which form admirable lightning conductors, but, unfortunately, at the expense of the insulating covering. Hence the apparatus at our large stations very rarely suffer from injury.

There are only two forms of lightning conductors introduced into the instruments adopted by the Postal Department. The one applied to the single needle and Morse apparatus, and the other to the Wheatstone's alphabetical instruments.

It was observed that when wires were knotted or tied together, electricity of high potential was discharged across this knot in preference to going through the loop. When a discharge takes place through a non-conductor, such as dry air, at the moment of discharge the resistance along the line of discharge is so far reduced as to allow the passage of the greater part, if not the whole of the current, so that, in point of fact, at the moment when the discharge occurs, through a layer of air or other elastic medium, a conductor of very low resistance is formed. Hence, as a current divides itself in inverse ratio to the resistance opposed to it, the greater portion, if not all, flies across the knot or shunt. This is only an example of Faraday's well known experiment, in which a long wire is so bent that two parts, a b, near its extremities, approach within a short distance, say $\frac{1}{4}$ inch in air. If the discharge of a Leyden jar be sent through such a wire, by far the largest portion, if not the whole, of the electricity will pass as a spark across the air at the interval, and not by the metal.

(To be continued.)

In view of Mr. Crookes' successful experiments with light as a motive power, the following account, taken from an astronomical work of 1845, of a similar experiment made about that time, is not without interest. The operator "constructed a small vane, in the form of a common weather-cock, of a very thin plate of copper, about an inch square, attached to one of the finest harpsichord wires about 10 inches long, and nicely balanced at the other end of the wire by a grain of very small shot. The instrument had also fixed to it, in the middle, at right angles to the length of the wire, and in a horizontal direction, a small bit of a very slender sewing needle, about half an inch long, which was made magnetical. In this state the whole instrument might weigh about 10 grains. The vane was supported in the manner of the needle in the mariner's compass, so that it could turn with the greatest ease; and to prevent its being affected by the vibrations of the air, it was inclosed in a glass case or box. The rays of the sun were then thrown upon the broad part of the vane, or copper plate, from a concave mirror of about two feet in diameter, which, passing through the front glass of the box, were collected into the focus of the mirror upon the copper plate. In consequence of this the plate began to move with a slow motion of about an inch in a second of time, till it had moved through a space of about $\frac{3}{4}$ inches, when it struck against the back of the box. The mirror being removed, the instrument returned to its former situation, and the rays of the sun being again thrown upon it, it again began to move, and struck against the back of the box as before. This was repeated three or four times, with the same success."

* At Monmouth I found a flat braided copper wire rope used about one inch broad. Its continuity is very doubtful. It had points at every 4 or 5 feet standing at right angles to the rope.

† At Lydney Church (Monmouthshire) I found a lightning conductor of iron gas tubing leaded into a loose stone, which simply rested upon a stone paving.

* From a paper read before the Society of Telegraph Engineers England, by W. H. Preece.

On the Inflammability of Coals, and on a New Pressed Coal.

Translated and abridged from Dr. Meldinger's paper in *Dingler's Journal*.

Coals in the more limited sense, as wood charcoal, peat charcoal and coke, the products of coking natural fuels, differ greatly in their inflammability, i. e., in their ability to come to a glow and unite with the oxygen of the air, and in regard to their power when once ignited of continuing to burn if exposed in small lumps to the air. Wood charcoal and coke form the greatest contrast in this respect; the former ignites easily and continues to burn, the latter kindles with difficulty and quickly goes out in the air. Each separate variety of both sorts exhibit quite large differences among themselves. The ordinary wood charcoal kindles with more difficulty than the baker's coal, and, as a rule, is extinguished if it is only lighted at one end, while with the latter the combustion extends over the whole mass and it is completely burned up. In the same way coals differ from each other very much. Gas coals are more combustible than the coke of metallurgical works; the so-called Saar coke is more combustible than the Ruhr coke. These differences are probably due to the molecular arrangement of the particles, to their density, and to their power of conducting heat. The denser the substance, depending as it does on the temperature at which it was prepared, the better conductor of heat and electricity it will be, and the more rapidly will the heat developed at one point spread throughout the whole mass. And, moreover, the denser the substance the fewer points of attack will be offered to the oxygen of the air, and the less heat can be generated in a unit of time at a given point. If heat is applied to a small spot on a large piece of dense (hard, heavy) coal, for the purpose of igniting it, a comparatively strong source of heat will be required to bring it to a glow or ignite it. It does not continue to burn after the source of heat is removed, because the warmth is rapidly distributed throughout the whole mass, and the heat newly generated by the combination of oxygen with the glowing coal is not sufficient to keep the temperature up to the burning point. A piece of coke ignited at one spot becomes black almost immediately after removing the source of heat. In like manner a piece of coke ignited throughout its mass, when taken from a stove, soon goes out, because the loss of heat by radiation from the whole surface and by convection on the air, is greater than the heat produced on the surface in the same time by combustion. Even blowing, which is employed with wood charcoal to stir up and quicken the flame, with small pieces of ignited coke, hastens its extinction.

The gas carbon which is formed on the walls of gas retorts and metallurgical coking furnaces, by the decomposition of hydrocarbons, possesses the greatest density and with it greatest conductivity; it seems to be almost combustible. It does not absorb a trace of water, and on this account, as well as on account of its hardness and power of conducting electricity, it is an excellent material for the negative poles in the Bunsen battery. Moreover, every coal can be converted into a similar substance by strongly heating.

The art of burning a difficultly combustible fuel, like coke, the older pit coals, especially anthracite, depends not so much on exposing it to a strong draft in a stove—i. e., burning a large quantity in a short time, which is the generally received opinion—but rather on keeping it in a glow, and this is accomplished by placing a large quantity of fuel in a pit or shaft-like fire place, and, when possible, lining it with a poor conductor of heat, like clay or stone. Under such circumstances, it is possible to burn a minimum quantity of a difficultly combustible fuel. It is also requisite that the pieces of fuel be small, pea or nut size, so that the largest possible surface shall be exposed to the draft of air. In this case a fire may be kept up in an iron stove with the consumption of but one-quarter pound of gas coke per hour. With coke from metallurgical works the combustion must be somewhat stronger, with anthracite still stronger, and, in the latter case, a fire box lined with clay or fire brick is recommended. If, on the other hand, the layer of fuel is thin, and consists of large lumps which leave large openings between them, a large excess of air will pass through the mass, and carry away a considerable quantity of heat which would otherwise remain in the pieces themselves, and could only be given out through the walls of the stove. A lively combustion must now be kept up (which can only be accomplished by a strong draft), in order to prevent the fire being extinguished, and the stove gets very hot. When coke first began to be used in iron stoves for warming rooms, this difficulty had to be contended with, since the pieces were not broken up or assorted, and its use as fuel was given up again. In 1871 the author for the first time called attention to the importance, when burning coke, of breaking it up. Since the gas works have begun to furnish it of suitable sized pieces, its use in the household as an acknowledged excellent fuel has increased wonderfully, and soon the whole production of the gas houses will be consumed by family use.

That coke can be burned, even in large pieces, without that strong draft, is proved by the fact that we often see men who are laying water pipes in streets, and joining them with lead, have a large iron basket holding nearly a hundred weight of coke, so that the glowing coke can be seen on every side. The air reaches the fuel without any draft, in the ordinary sense of the word, and produces a sufficient quantity of heat in the interior to keep it burning; the surface, where the loss of heat takes place, is here small, relatively, to the total mass within which the combustion takes place.

From the foregoing we may define the inflammability of a coal to be the ease with which a small piece becomes ignited or reaches its igniting temperature when exposed to a source of heat in the open air, and continues to burn after the source of heat is removed. The igniting temperature itself, i. e., the temperature at which the glowing mass combines with the oxygen of the air, may be considered equal for all kinds of coke.

Charcoal buried in pits in the forests, and used in different industries, wherever it is desirable to keep a moderate and flameless fire, has different faults, which in many cases are found unpleasant. The chief of these is that incompletely burned pieces (brands) give out a dangerous gas, so that it is impossible to keep a fire in an open space without a pipe to convey the gases into a chimney. Beside this, charcoal sometimes cracks and snaps, throwing out sparks, which renders an open fire dangerous. And further, charcoal is not so easily ignited that a small fire can be started readily, unless the coal is first brought to a glow in another fire; nor does the fire spread over the whole mass when lighted at one end, but goes out, unless a blast of air is thrown on it or a number of pieces are piled up together. It is impossible to keep a steady small charcoal fire for several hours in the open air.

Within a few years there has been introduced into the European market a prepared charcoal, which is free from these faults, and, to a certain extent, may be considered as a new and valuable fuel. The substance burns without smoke, does not throw out sparks; ignited at one spot, the fire spreads slowly over the whole mass, and a perfectly steady fire may be kept for many hours, according to the size of the pieces.

As far as now known this fuel is made of pulverized charcoal, to which is added a small quantity of saltpeter and an adhesive substance like gum. The high percentage of ash (4 or 5 times that of charcoal) indicates that clay is also mixed with it. The oxygen in the saltpeter causes the combustion to continue when once started, and probably renders it smokeless. The products of combustion are not entirely odorless; in our samples there was a characteristic odor of ammonia perceptible. The production of carbonic oxide is not probable, at least so long as a single piece burns in the open air. Some samples evolved the unpleasant stupefying smell which always accompanies the combustion of charcoal.

The author then goes on to state that he does not know who was the inventor of this pressed coal, that he first met with it in 1869 as a French product, that he afterward obtained some with an English label "combustible stoker." In conclusion, he gives the results of several experiments with different specimens. The calorific effect he puts in one case at about 6400 units, the specific gravity at 0.8, the price one franc for 10 pieces 4 inches long, 1.5 inches wide and three-fifths of an inch thick, weighing 26 grammes. The ash amounted to 12 per cent. Other specimens gave different results.

The *Clarion* (Pa.) *Republican* says: Redbank Furnace, Reynolds & Moorhead proprietors, is the only one in blast in this county. It is an admirably managed institution, and employs from three to four hundred hands.

All the nail kegs made at the Pittsburgh saw mills are needed at the nail factories of Shoemaker & Co. and Zug & Co.

A twenty-four-pot Siemens furnace is being erected in the shovel factory of Hussy, Binns & Co.

The Chesapeake Works, at Harrisburg, still continue in active operation.

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desires of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 2/; every additional line, 10d. Price, 6d. per Copy, or 30/ per annum, inclusive of postage to the United States.

Important to Manufacturers.

BISSELL, WELLES & MILLET,
Auctioneers and Commission Merchants, No. 15 Murray St., New York.

Solicit from Manufacturers and others consignments of Hardware and Cutlery for our weekly Auction Sales to the Trade, or at private sale for cash, as desired. Our facilities for moving large lines of goods are unsurpassed. Advances made if desired.

Furnace Engineering.
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Furnace companies supplied with first-class men for all positions. Competent managers and founders desiring situations are requested to send full particulars. Correspondence solicited on all topics of interest in furnace work. Letters answered promptly without charge. Address,
EDWARD J. HALL, Jr., Blast Furnace Engineer,
463 Franklin Street, BUFFALO, N. Y.

Roller Wanted.

One accustomed to rolling Skelp and Band Iron.

The above can have a good and permanent job by applying to the undersigned without delay. One that can turn rolls would be preferred.

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Special Notices.

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Burglars beaten by **Sargent & Greenleaf's Chronometer Lock.** On the night of the 6th instant burglars entered the house of the Cashier of the Barre Bank, binding and gagging himself and family. They then undertook to break open the bank safe, but as it was supplied with one of Sargent & Greenleaf's Chronometer Locks, which was set to open at 9 o'clock the following morning, they gave up all attempts to open it and departed, having secured only ten dollars and a quantity of unsigned bank bills.

This is the same lock that saved the treasurer of the Mahawick Bank of Great Barrington, Mass., on the 29th of May, when the cashier was treated in the same way, with like disappointment to the burglars. The saving of these two banks by being supplied with this Chronometer Lock would supply every bank in Massachusetts and Vermont.

For sale at 300 Broadway, New York.

An experienced Traveling Salesman in Hardware and Cutlery, intimately acquainted with the jobbing and retail houses throughout the Southern States in above lines, is open for engagement.

Address,
HARDWARE, Box 5,
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TENTH Industrial Exhibition

UNDER THE AUSPICES OF THE
Mechanics' Institute,
OF SAN FRANCISCO.

Manufacturers, Mechanics, and others, are advised that the above Exhibition will be opened in San Francisco on the
17th day of August
next, and will continue open at least one month. The Board of Managers invite all who desire to exhibit, to send in their application for space without delay to **Mr. J. H. CULVER,** Secretary,
27 Post St., San Francisco, who will promptly answer all inquiries.

700,000 PERSONS
from all parts of the Pacific visited the Exhibition of 1874, to see what could be learned or purchased in San Francisco and the United States. San Francisco, with its population of one quarter of a million, is in intimate relations with Japan, China, Australia, Mexico, Hawaiian Islands, British Columbia, the various islands of the Pacific and contiguous domestic territory. There is no charge of exhibiting, and power for driving machinery, etc., is furnished free. By order of the Board of Managers.

A. S. HALLIDIE, Pres.
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FOR SECURING INVENTIONS, TRADE MARKS, &c., IN AMERICA AND EUROPE.
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A Light, Handsome Office.
Possession Immediately.
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We have removed our office and stock of Cutlery to
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WANTED.—A situation by a young man having had ten years' experience in the Hardware and Store Business, either as clerk or salesman, or would travel. Hardware preferred.
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Merchant Iron or Nails
Wanted in exchange for 300 tons No. 1 Wrought Scrap Iron.
GILCHRIST & GRIFFITH,
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A. PURVES & SON,
Corner South & Penn Streets, Phila.,
Dealers in
Scrap Iron & Metals, Machinery, Tools, Shafting & Pulleys, Steam Engines, Pumps & Boilers, Copper, Brass, Tin, Rabbit Metal, Foundry, Facing, Best Quality Ingot Brass.
Cash paid for all kinds of Metals and Tools.

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THE TRENTHAM VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of
Iron and Steel Drop Forgings
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HERMANN BOKER & CO., Proprietors,
101 & 103 Duane St., N. Y.

McHaffie Direct Steel Castings Co.
STEEL CASTINGS,
Solid and Homogeneous, guaranteed to stand a Tensile Strain of 25 tons per square inch. An invaluable substitute for expensive WROUGHT IRON FORGINGS or for Iron Castings, where great strength is required. Office, cor. Evident and Leeward Sts., PHILADELPHIA.
Send for Circular and Price List.

WANTED.—A situation either as salesman or traveler, by a man who has had many years' experience in the general and carriage hardware business. Is an active working man, and can refer to first-class houses in the trade, based on an acquaintance of twenty years. Address, **HARDWARE,** Box 638, Rochester, N. Y.

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\$15,000 to \$20,000.

A manufacturing firm with unusual facilities for producing goods in their line of manufacture, desires the above amount with a special partner. The firm is in healthy condition, made something less than 20 per cent. profit for the six months of 1875, notwithstanding a very depressed condition of prices, and want the money to carry stock only. First-class reference given. Address, **SPECIAL,** Office of *The Iron Age*, 10 Warren St., N. Y.

CHARLES GOUGH, introducer of manufactured goods, which retail for \$5 or less; also, manufacturer of Gough's J. L. Pet and Giant Ice Cream Freezers; Gough's Noiseless Spring Bed Bottoms. Office, saunieroom and warehouse, 436 Market St., Phila. Manufacturers who wish to avail themselves of my established business connections, for the sale of desirable articles, are invited to correspond. Best of reference given and required.

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The 44th Exhibition of the American Institute will open September 8th; Machinery will be received after August 15th, other goods after August 25th. For particulars address "General Superintendent, American Institute, New York."

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Car Shop in Conshohocken, Pa., 50x100 ft. fronting on P. and R. R., with blacksmith shop 20x30 ft., engine house 15x30, 25 horse engine, and all the modern machinery necessary. The lot is 185x300 ft. For particulars call on or address,
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In the State of Indiana For Sale, **FOR 30 DAYS ONLY.** \$30,000 capital required. Sales now running from \$400 to \$600 per day. The very best relations given for wanting to sell, which have no relation with the business. Such an opportunity for safe and profitable investment is rarely ever offered.
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A Hardware Manufactory
Having an established trade, now in full running order, and making a staple line of goods. Sold to dissolve a partnership and settle an estate.
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Rolling Mill and Bridge Building Machinery,
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Upright Corliss Engine, 33 in. cylinder, 5 ft. stroke; wheel, 34 tons, 25 ft. diam.
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Milling Machines, and all Machinery necessary for Bridge Work. In lots to suit. Apply to
WM. E. COFFIN & CO.,
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FOR SALE, HARDWARE BUSINESS.
Wishing to engage in other business, we offer our stock of Hardware For Sale on reasonable terms. Our stock comprises: Stoves, Tin ware, Shelf Hardware, etc., and has been selected with care and bought at low cash prices. To a person wishing to engage in business this offers inducements. Stock will invoice about \$6000. For particulars, address,
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DISCOUNT LISTS.
W. Butts and C. Butts, 13 discounts..... each 75c
Iron Screws & C. & P. Bolts 15 discounts..... " 75c
DAYTON & CAMERON,
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For Sale.
A clean and complete stock of Hardware, Tin and Stoves, with the good will of an old and well established trade. Room centrally located and been used for same business for 25 years past, and in one of the most substantial and rapidly growing cities of Northern Ohio. Do a business of about \$75,000 per year, and will invoice about \$30,000. Will sell Hardware separate if desired. Good and satisfactory reasons given for selling. Apply to, or address,
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A prosperous and well known Hardware Manufacturing business in one of the most thriving towns in New England. A rare opportunity for moderate capital. None but those meaning business need apply. Address,
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Several Second-Hand Railroad Locomotives, 4 ft. 8 1/2 in. Gauge.
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I have three patents for Dies, Machinery, and Tools for making Augers and Bits, each running seventeen years; dated as follows: Dec. 19, 1855; January 31, 1866, and July 3, 1866. There is a special claim on each of the Dies. All persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings.**
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Having during the past 10 years constructed and put in operation a number of the most successful Charcoal Blast Furnaces in the country, and having a competent corps of workmen constantly in my employ, I am enabled to offer advantages in constructing or remodeling upon the latest and most approved plans.
Examinations of Furnace Property made and reported upon when solicited. Correspondence promptly attended to.
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An 1/2 inch mill train for making Merchant, Band and op Iron. Will be sold cheap.
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Or to lease with privilege to buy: consisting of Foundry, Machine Shop, with powerful steam engines, and other buildings. Water front on North River, Peekskill, 42 miles from New York, comprising 2 1/2 acres. Apply for particulars at
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The Carbon Stove Company,
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Will sell their Foundry, with all its appurtenances, business and good will, upon very liberal and accommodating terms, offering to any party wishing to engage in the Stove or general Foundry Business a rare opportunity.

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The Buildings, Machinery and Appliances are all in prime order, and the assortment of Patterns, &c., for Stove, Range or Heater work, unsurpassed.
Address, for terms or other particulars,
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Will sell, on good terms, one of the best arranged House Furnishing Stores in Canada West, at St. Thomas. The premises are roomy, the buildings having been arranged especially for this trade, with Tin-smith's workshops and benches complete for 12 men.

Present Stock about \$6000.
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Metal Reporter of "The Iron Age,"
Box 3091, N. Y.

Trade Report.

Office of THE IRON AGE
WEDNESDAY EVENING, July 21, 1875.

There are indications of a somewhat better feeling in business circles, which indicates rather more confidence than has hitherto been felt in the prospect of rumored activity. From such facts as have come to our knowledge we conclude that any expectations which may be entertained of a great and profitable activity between this and the end of the year will be disappointed. We look for a steady improvement, so gradual as to be scarcely noticeable, but which will lead to a fall and winter trade considerably larger in its aggregate volume and profit than that of last year. It is doubtful if we shall ever again witness a return to the methods of doing business which called for a semi-annual replenishment of stocks. When retail merchants laid in their stocks in the spring, and bought nothing more until fall, they enjoyed the doubtful advantage of larger and longer credits than they can now obtain. Credits are now more restricted, buyers, as the rule, more cautious. The mail and telegraphs, cheap land and water freights, and traveling salesmen always on the road, have rendered it possible for the Western and Southern retailer to buy his stock when he wants it, and as he wants it, and to take advantage of any favorable turn in the market or break in freights. As a consequence, trade is more evenly distributed through the year than formerly, and there would no longer be seasons of special activity in trade, were it not for the fact that in many branches of business the requirements of consumers are different in summer and winter. These changes must be taken into account when estimating the probabilities of the fall trade, and we can now estimate the amount of business done by comparing the aggregate result of one year's trade with that of another.

In the financial markets there is a better feeling, railway stocks having advanced and gold declined, both resulting from an advance in breadstuffs. The money market has continued extremely easy, with rates to borrowers on call at 1½% @ 2 per cent., and on prime borrowers' paper, 3½% @ 5 per cent.

The gold market has been depressed, but there has been a very good borrowing demand, and cash gold has commanded a very fair premium for its use. On Thursday, the Treasury sold \$1,000,000 coin at 114.81½ @ 114.94. The following are the highest and lowest quotations of the gold room:

	Highest.	Lowest.
Thursday.....	115	114½
Friday.....	115	114½
Saturday.....	114½	114½
Monday.....	114½	113½
Tuesday.....	114½	113½
Wednesday.....	114½	113½

The stock market has been strong, but somewhat irregular, with principal dealings in Western Union, St. Paul, Northwest, Lake Shore, Pacific Mail and Erie. We give below the highest and lowest of to-day's quotations of active shares.

Government bonds have declined in sympathy with gold; railway mortgages continue strong, and, with other desirable securities, in good investment demand. We give below the closing quotations of governments. The bank statement is as remarkable and unexplainable as that of last week, although in a different way. The result is a large increase (over \$3,000,000) in both total and surplus reserve, the latter now amounting to \$28,053,550. The following is a comparison of the averages for the past two weeks:

	July 10.	July 17.	Difference.
Loans.....	\$290,866,800	\$279,558,800	Dec. 1,108,000
Specie.....	16,937,300	16,964,900	Inc. 27,600
Leg. tend.....	70,661,890	72,705,300	Inc. 3,144,100
Deposits.....	220,660,900	220,660,900	Inc. 4,400
Circulation.....	18,854,800	18,801,600	Dec. 53,200

The following table shows the foreign trade movements for the week:

	1875.	1874.	1875.
Total for week.....	\$6,529,652	\$6,354,478	\$6,541,222
Prev. reported.....	\$26,641,911	\$24,075,999	\$26,488,029

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils.....	372	\$2,358
Brass goods.....	9	1,469
Bronzes.....	11	1,437
Cutlery.....	48	14,688
Guns.....	31	1,977
Hardware.....	46	4,099
Iron, pig, tons.....	800	12,761
Iron, cotton 118.....	428	1,242
Iron, other, tons.....	8	5,625
Lead, pigs.....	3,710	16,292
Nails.....	16	1,937
Needles.....	15	5,625
Old metal.....	1	673
Platina.....	1	1,139
Saddlery.....	6	1,543
Steel.....	2,914	30,585
Tin, boxes.....	29,854	236,147
Tin, slabs, 3184 lbs.....	294,705	57,784
Wire.....	943	9,145
Zinc.....	219,873	13,601

EXPORTS, EXCLUSIVE OF SPECIE.

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Since Jan. 1.....\$23,178,396 \$23,431,477 199,089,281

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GENERAL HARDWARE.

The arrival of some buyers from the West and South and an improvement in the inquiry for goods by mail has had the effect of relieving the market to a considerable degree of the dullness which has characterized it for a long time. A good many travelers have already started out, and some of them have been heard from with fair order sheets. The general tone of the market is decidedly firm, and the trade here express the belief that, with but very few exceptions, bottom prices have been reached.

We are informed that the American Screw Company have withdrawn from the association heretofore consisting of the American Screw Company, of Providence, R. I.; National Screw Company, of Hartford, Conn.; United States Screw Company, of Meriden, Conn.; Union Steel Screw Company, of Cleveland, Ohio, and have given notice that after thirty days their prices will be largely reduced, so that the issuing of their next circular will be looked forward to by the trade with some interest.

Already a slight improvement is reported in the demand for Foreign Hardware, and prices continue unchanged. The Wiebusch & Hilger Hardware Co. have been advised by cable of a reduction of one shilling per cwt. on the sterling price of Peter Wright's Anvils, but owing to the large advance in the cost of transportation, the decline will not affect the cost of the goods here, which are quoted as before, 11c. @ 11½c., gold.

Since our last writing, Henry Seymour & Co.'s factory has been damaged by fire. Only a portion of the establishment received serious injury, and we are informed that it will be repaired and in full running order at an early day. Their agents, the Wiebusch and Hilger Hardware Company, have in stock a complete assortment of their goods. The Hart, Bliven & Mead Manufacturing Co. quote Shovels and Tongs on pages 140 to 144, inclusive, of their illustrated catalogue at discount 55 and 10 and 2 per cent extra for cash, instead of discount 50 and 10 per cent, as formerly.

The demand for Nails continues dull, and prices remain unchanged. The market for standard brands may be quoted firm at \$3.25, net, for 10d., in 200 keg lots, and for small lots, \$3.30 @ \$3.40, according to quantity. There are in the market some outside brands of Nails, which could be purchased in lots of 100 to 200 kegs at 10 cents reduction from the above named figure.

We take from the British Trade Journal of a recent date the following handsome acknowledgment of American enterprise:

AN ELABORATE PATTERN BOOK.—We are accustomed to see illustrated trade lists and pattern books irreproachable in their general get up, and displaying no little artistic taste. But although many of our manufacturers may be justly proud of their productions in this line, they must, perforce, yield the palm to an American firm, who have accomplished quite the greatest thing in pattern books it has been our lot to see. Messrs. Mallory, Wheeler & Co., of New Haven, Connecticut, the firm referred to, are, we understand, the largest lock manufacturers in the State. Their pattern book, of which a copy has lately reached us, is a most elaborate affair, measuring 18½ by 14½ inches, and containing 292 pages of heavy white paper as heavy as Bristol board. It is devoted exclusively to the illustration of locks, keys, padlocks and door knobs, each article being represented of exact size. The drawings show a distinction between the several metals which are represented in bronze of the exact tint. The locks illustrated are of the American type, the majority being of malleable cast iron, with brass, copper, or gun metal bolts and mountings. The keys are shown to be jointed in the shank, which admits of their being folded up when not in use.

We are informed that Messrs. Mallory, Wheeler & Co. are shipping their locks pretty extensively to our colonies, and it would appear that they are preparing to attack the English market. One thing is certain, that their pioneer in the shape of this splendid pattern book has already created no little sensation. The cost of the 292 copies printed is stated to be \$16,000, and if this be correct each single copy has cost \$28. Such a conspicuous example of commercial enterprise deserves recognition.

Mallory, Wheeler & Co., Sargent & Co., Agents, have issued the following descriptive list of new goods, which have been added to their assortment since January, 1875:

Improved Builders' Mortise Locks.

To Reverse, by simply pulling Latch Bolt forward and turning half round.

	Per doz.
No. 994, 3½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Tinned Malleable Iron Key.....	\$6.00
No. 994½, 3½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Brass Key.....	7.50
No. 998, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Tinned Malleable Iron Key.....	7.00
No. 998½, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Brass Key.....	8.50
No. 1002, 5½x3 in. (Old No. 596) Brass Front, Bolts and Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 34 Changes.....	21.00
No. 1002½, 5½x3 in. (Old No. 596) Brass Front, Bolts and Striking Plate, Thin Bit Nickel Key, 3 Rack Tumblers, 100 Changes.....	27.00

Mortise Knob Locks.

To Reverse, by removing Cap.

	Per doz.
No. 960, 3½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Tinned Malleable Iron Key.....	\$5.50
No. 960½, 3½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Brass Key.....	7.00
No. 964, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Tinned Malleable Iron Key.....	6.50
No. 964½, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Brass Key.....	8.00
No. 970, 3½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 34 Changes.....	7.50

No. 974, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 34 Changes.....	8.50
No. 979, 4½x3 in. Lacquered Iron Front, Brass Bolts, Wrought Iron Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 24 Changes.....	11.50
No. 980, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 34 Changes.....	12.50
No. 981, 4½x3 in. Lacquered Iron Front, Bolts and Striking Plate, Thin Bit Nickel Key, 1 Rack Tumbler, 24 Changes.....	14.50

½ Inch Thick, for Thin Doors.

No. 991, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Tinned Malleable Iron Key.....	8.00
No. 991½, 4½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate, Brass Key.....	9.50
No. 998, 4½x3 in. Lacquered Iron Front, Brass Key, Wrought Iron Striking Plate.....	11.50
No. 997, 4½x3 in. Brass Front and Striking Plate, Iron Bolts, Brass Key.....	12.50
No. 996, 4½x3 in. Brass Front, Bolts, Striking Plate and Key.....	14.50

Master Keyed Rabbeted Mortise Knob Lock.

Without Knobs.

5-16 inch Hub.

No. 600, 5½x4 in. Brass Front, Bolts and Striking Plate, Brass Key with Cast Steel Bit, 4 Flush Rack Tumblers, 140 Changes..... \$46.00 |

Mortise Dead Locks.

No. 1000, 2½x3 in. Brass Front and Striking Plate, Iron Bolt, Thin Bit Nickel Key, 1 Rack Tumbler, 34 Changes..... \$7.50 |

No. 1004, 2½x3 in. Brass Front and Striking Plate, Iron Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 10.50 |

No. 1002, 2½x3 in. Brass Front and Striking Plate, Iron Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 13.50 |

No. 1003, 2½x3 in. (Old No. 1024) Brass Front, Bolt and Striking Plate, Thin Bit Nickel Key, 3 Rack Tumblers, 34 Changes..... 8.75 |

No. 1004, 2½x3 in. Brass Front, Bolt and Striking Plate, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 11.75 |

No. 1005, 2½x3 in. Brass Front, Bolt and Striking Plate, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 14.75 |

Mortise Latches.

With Thumb Bolt.

5-16 inch Hub.

No. 606, 2½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate..... \$9.50 |

No. 607, 2½x3 in. Lacquered Iron Front, Iron Bolt, Wrought Iron Striking Plate..... 10.75 |

No. 608, 2½x3 in. Brass Front, Iron Bolts, Brass Striking Plate..... 11.50 |

No. 609, 2½x3 in. Brass Front, Iron Bolts and Striking Plate..... 12.75 |

Improved Builders' Upright Rim Knob Locks.

To Reverse, by simply pulling Latch Bolt forward and turning half round.

Without Knobs.

5-16 inch Hub.

No. 1023, 4½x3 in. Iron Bolts, Thin Bit Tinned Malleable Iron Key, 1 Tumbler..... \$6.00 |

No. 1023½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Tinned Malleable Iron Key, 1 Tumbler..... 7.50 |

No. 825, 4½x3 in. Iron Bolts, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 12.50 |

No. 824, 4½x3 in. Iron Bolts, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 15.50 |

No. 827, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Nickel Key, 2 Rack Tumblers, 30 Changes..... 14.00 |

No. 828, 4½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 17.00 |

No. 829, 4½x3 in. Brass Bolts, Thin Bit Nickel Key, 3 Rack Tumblers, 30 Changes..... 14.50 |

No. 830, 4½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 50 Changes..... 17.50 |

No. 831, 4½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Nickel Key, 2 Rack Tumblers, 30 Changes..... 17.25 |

No. 832, 4½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 50 Changes..... 20.25 |

No. 925, 5½x3 in. Brass Front, Thin Bit Brass Key, 1 Rack Tumbler, 34 Changes..... 10.50 |

No. 926, 5½x3 in. Brass Bolts, Thin Bit Brass Key, 1 Rack Tumbler, 24 Changes..... 12.50 |

No. 927, 5½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Brass Key, 1 Rack Tumbler, 24 Changes..... 12.00 |

No. 928, 5½x3 in. Brass Bolts and Thumb Bolt, Thin Bit Brass Key, 1 Rack Tumbler, 24 Changes..... 15.25 |

Rushby's Horizontal Rim Knob Locks.

To Reverse, by removing Cap.

5-16 inch Hub.

No. 0249½, 4½x3 in. Iron Bolts, Thin Bit Tinned Malleable Iron Key, with Lever Stop..... 7.00 |

No. 0251½, 4½x3 in. Iron Bolts, Thin Bit Brass Key, with Lever Stop to Latch..... 8.50 |

No. 0253½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Tinned Malleable Iron Key..... 7.00 |

No. 0247½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Brass Key..... 8.50 |

No. 0243½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Tinned Malleable Iron Key..... 8.25 |

No. 0245½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Brass Key..... 9.75 |

Spark's Horizontal Rim Knob Locks.

To Reverse, by simply pulling Latch Bolt forward and turning half round.

5-16 inch Hub.

No. 0249½, 4½x3 in. Iron Bolts, Thin Bit Tinned Malleable Iron Key..... 8.75 |

No. 0251½, 4½x3 in. Iron Bolts and Thumb Bolt, Thin Bit Brass Key..... 10.25 |

Our Locks Nos. 0249½ and 0251½ are now made with a Lever Stop to Latch, at the same prices, \$5.75 and \$7.25.

Builders' Horizontal Rim Closet or Dead Locks.

For Right or Left Hand Doors.

No. 841, 3½x3 in. Iron Bolt, Thin Bit Tinned Malleable Iron Key, 1 Rack Tumbler..... \$6.00 |

No. 843, 3½x3 in. Iron Bolt, Thin Bit Nickel Key, 1 Rack Tumbler, 24 Changes..... 7.50 |

No. 845, 3½x3 in. Iron Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 36 Changes..... 10.50 |

No. 844, 3½x3 in. Iron Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 36 Changes..... 13.50 |

No. 845, 3½x3 in. Brass Bolt, Thin Bit Nickel Key, 1 Rack Tumbler, 24 Changes..... 9.00 |

No. 846, 3½x3 in. Brass Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 36 Changes..... 12.50 |

No. 847, 3½x3 in. Brass Bolt, Thin Bit Nickel Key, 3 Rack Tumblers, 36 Changes..... 15.50 |

Improved Builders' Upright Rim Front Door Locks.

To Reverse, by simply pulling Latch Bolt forward and turning half round.

Straight Spindle.

Without Knobs.

5-16 inch Hub.

No. 1053, 6½x4 in. Heavy Iron Bolts, Brass Turn Knob and Plate, Brass Key, 1 Tumbler..... \$28.50 |

No. 1054, 6½x4 in. Heavy Iron Bolts, Brass Turn Knob and Plate, Brass Key, 2 Tumblers..... 31.00 |

No.	Per doz.	No.	Per doz.	No.	Per doz.	No.	Per doz.	No.	Per doz.
300	25.00	843	32.50	1300	6.00	311	4.50	360	75.00
302	38.00	844	35.00	1301	6.00	312	3.00	365	48.00
303	38.00	845	25.00	1302	7.50	313	3.00	366	48.00
304	34.00	860	3.75	1303	7.50	316	4.00	371	51.00
305	84.00	870	10.25	1311	9.00	317	3.00	372	47.00
310	96.00	870	10.25	1311	8.50	319	6.50	371	51.00
315	50.00	875	8.75	1311 1/2	12.50	319	6.50	371 1/2	66.00
320	60.00	880	5.00	1313	13.50	320	6.75	372	34.00
321	96.00	880	5.00	1313 1/2	13.50	321	18.00	375	47.00
322	60.00	886	6.25	1313	14.50	332	9.00	375	21.00
325	99.00	889 1/2	8.25	1313 1/2	18.50	333	9.00	380	21.00
330	111.00	887	8.25	1314	17.50	334	13.00	385	24.00
335	62.00	887 1/2	10.25	1314 1/2	21.50	335	18.00	386	24.00
340	72.00	890	9.50	1315	7.50	336	12.00	391	14.00
341	111.00	884 1/2	11.50	1320	7.00	337	18.00	392	14.00
342	72.00	890	9.75	1325	12.25	338	7.25	393	23.00
345	64.00	895	7.00	1330	9.00	339	13.00	396	23.00
348	44.00	898	10.50	1335	10.50	340	9.00	396	23.00
350	68.00	901	7.50	1340	12.50	341	9.00	396	23.00
355	92.00	901 1/2	9.50	1345	20.50	342	13.00	397	30.00
358	60.00	902	10.50	1350	10.50	343	18.00	398	30.00
375	8.00	905	12.50	1355	12.50	344	13.00	400	45.00
380	9.25	903	12.50	1360	15.25	345	18.00	405	45.00
385	11.50	903 1/2	14.50	1365	22.25	348	30.00	411	30.00
390	12.50	905	6.50	1375	13.50	350	1.50	413	21.00
392	3.75	910	12.50	1380	15.50	351	1.75	413	21.00
393	9.11	911	12.50	1385	18.50	352	3.75	414	27.00
400	5.51	920	8.50	1386	30.50	353	3.01	416	30.00
402	7.00	925	11.25	1387	33.50	354	3.50	417	32.00
412	6.00	930	11.00	1388	35.75	355	4.00	418	38.50
418	7.00	935	12.50	1390	15.00	356	6.00	420	50.00
425	9.50	940	8.00	1395	17.00	357	5.00	421	3.01
428	10.51	945	14.00	1400	21.25	358	5.00	425	3.75
432	12.50	950	6.50	1411	32.50	360	63.00	426	8.75
438	11.50	955	12.50	1415	32.50	361	61	430	6.50
445	8.00	960	10.00	1403	39.25	362	63.00		
460	10.00	965	8.50	1405	38.00				
465	11.00	970	10.00	1410	38.00				
470	10.00	975	10.00	1415	38.00				
471	10.50	976	18.00	1430	15.00				
472	11.50	978	20.00	1435	17.00				
474	13.50	980	31.00	1440	18.00				
475	7.00	985	14.50	1445	19.00				
480	9.00	990	27.00	1450	21.00				
485	11.00	995	24.00	1455	24.00				
490	12.00	1000	27.00	1475	28.00				
495	14.00	1005	30.00	1480	35.00				
498	15.50	1015	35.00	1485	44.00				
498	14.00	1020	22.00	1490	42.00				
500	17.00	1025	31.00	1495	48.00				
510	30.00	1030	37.00	1500	52.00				
515	16.00	1035	40.00	1505	57.75				
520	19.50	1040	38.00	1503	7.25				
533	8.00	1045	44.00	1507	7.00				
538	9.50	1060	29.00	1508	8.50				
538	8.50	1065	31.00	1510	7.00				
535	8.00	1070	35.00	1511	8.25				
540	10.00	1075	41.00	1515	8.50				
545	12.00	1090	39.00	1516	9.75				
555	13.00	1095	44.00	1520	8.50				
560	15.00	1095	51.00	1520	12.50				
565	17.50	1110	18.00	1533	15.50				
570	27.00	1115	31.00	1535	10.00				
575	27.00	1118	31.00	1540	12.00				
576	14.50	1120	38.00	1545	15.50				
578	15.00	1125	31.00	1555	18.50				
580	19.00	1130	40.00	1560	10.50				
581	25.00	1135	42.00	1565	12.00				
585	27.00	1140	60.00	1569	14.50				
588	28.50	1145	21.00	1570	17.50				
590	30.00	1150	24.00	1575	20.00				
595	33.00	1155	24.00	1580	24.00				
600	30.00	1160	30.00	1585	17.50				
603	21.00	1165	44.00	1590	30.50				
605	31.00	1175	23.00	1600	30.00				
608	24.00	1180	31.00	1605	23.75				
610	27.00	1185	35.00	1610	28.00				
615	35.00	1190	40.00	1635	46.00				
620	50.00	1195	43.00	1640	52.00				
625	50.00	1220	8.50	1645	44.00				
630	50.00	1225	8.50	1650	47.00				
Hotel.		1225A	7.00	1655	50.00				
650	38.00	1225B	7.50	1660	56.00				
660	38.00	1225C	10.50	1665	52.00				
0160	8.00	1230	6.50	1675	58.00				
700	5.50	1260A	8.50	1680	61.00				
705	6.75	1260B	9.00	1685	48.00				
710	5.00	1265A	12.00	1690	51.00				
715	5.00	1265B	12.50	1695	60.00				
730	3.75	1325	7.75						
735	5.00	1325 1/2	11.75						
740	5.00	1326	11.75						
745	6.25	1327 1/2	17.75						
750	5.00	1340	7.50						
755	5.00	1345	7.50						
760	3.50	1344	9.25						
761	4.50	1345	7.00						
765	4.75	1355	8.50						
770	4.00	1365	11.00						
800	10.00	1367	5.25						
805	10.00	1367 1/2	5.50						
810	25.00	1368	6.75						
815	14.00	1368 1/2	7.00						
820	13.00	1370	8.25						
825	13.00	1371	8.25						
830	16.00	1371 1/2	5.75						
835A	37.00	1372	7.00						
835D	30.00	1373 1/2	7.25						
840	30.00	1374	7.00						
841	13.00	1374	8.50						

Door Keys.			
Class.	Per doz.	Class.	Per doz.
1.	\$1.50	3.	1.50
2.	3.00	4.	3.00
3.	3.00	5.	3.00
4.	3.00	6.	3.00
5.	3.00	7.	3.00
6.	3.00	8.	3.00
7.	3.00	9.	3.00
8.	3.00	10.	3.00
9.	3.00	11.	3.00
10.	3.00	12.	3.00
11.	3.00	13.	3.00
12.	3.00	14.	3.00
13.	3.00	15.	3.00
14.	3.00	16.	3.00
15.	3.00	17.	3.00
16.	3.00	18.	3.00
17.	3.00	19.	3.00
18.	3.00	20.	3.00
19.	3.00	21.	3.00
20.	3.00	22.	3.00
21.	3.00	23.	3.00
22.	3.00	24.	3.00
23.	3.00	25.	3.00
24.	3.00	26.	3.00
25.	3.00	27.	3.00
26.	3.00	28.	3.00
27.	3.00	29.	3.00
28.	3.00	30.	3.00
29.	3.00	31.	3.00
30.	3.00	32.	3.00
31.	3.00	33.	3.00
32.	3.00	34.	3.00
33.	3.00	35.	3.00
34.	3.00	36.	3.00
35.	3.00	37.	3.00
36.	3.00	38.	3.00
37.	3.00	39.	3.00
38.	3.00	40.	3.00
39.	3.00	41.	3.00
40.	3.00	42.	3.00
41.	3.00	43.	3.00
42.	3.00	44.	3.00
43.	3.00	45.	3.00
44.	3.00	46.	3.00
45.	3.00	47.	3.00
46.	3.00	48.	3.00
47.	3.00	49.	3.00
48.	3.00	50.	3.00
49.	3.00	51.	3.00
50.	3.00	52.	3.00
51.	3.00	53.	3.00
52.	3.00	54.	3.00
53.	3.00	55.	3.00
54.	3.00	56.	3.00
55.	3.00	57.	3.00
56.	3.00	58.	3.00
57.	3.00	59.	3.00
58.	3.00	60.	3.00
59.	3.00	61.	3.00
60.	3.00	62.	3.00
61.	3.00	63.	3.00
62.	3.00	64.	3.00
63.	3.00	65.	3.00
64.	3.00	66.	3.00
65.	3.00	67.	3.00
66.	3.00	68.	3.00
67.	3.00	69.	3.00
68.	3.00	70.	3.00
69.	3.00	71.	3.00
70.	3.00	72.	3.00
71.	3.00	73.	3.00
72.	3.00	74.	3.00
73.	3.00	75.	3.00
74.	3.00	76.	3.00
75.	3.00	77.	3.00
76.	3.00	78.	3.00
77.	3.00	79.	3.00
78.	3.00	80.	3.00
79.	3.00	81.	3.00
80.	3.00	82.	3.00
81.	3.00	83.	3.00
82.	3.00	84.	3.00
83.	3.00	85.	3.00
84.	3.00	86.	3.00
85.	3.00	87.	3.00
86.	3.00	88.	3.00
87.	3.00	89.	3.00
88.	3.00	90.	3.00
89.	3.00	91.	3.00
90.	3.00	92.	3.00
91.	3.00	93.	3.00
92.	3.00	94.	3.00
93.	3.00	95.	3.00
94.	3.00	96.	3.00
95.	3.00	97.	3.00
96.	3.00	98.	3.00
97.	3.00	99.	3.00
98.	3.00	100.	3.00
99.	3.		

Mortise Knob Locks.		
Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.		
No. 412, 3½x3 in. Patent Lever, Lacquered Iron Front and Strike, Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$6.00
No. 422, 3½x3 in. Patent Lever, Lacquered Iron Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		7 50
No. 428, 3½x3 in. Patent Lever, Brass Front and Strike, Iron Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		9 50
No. 432, 3½x3 in. Patent Lever, Brass Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		13 50
No. 438, 3½x3 in. Patent Lever, Lacquered Iron Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		13 50
No. 496, 4x3½ in. Brass Front and Strike, Brass Bolts and Hub, Nickel Plated Steel Bit Key, one Tumbler, 21 Changes.....		19 50
Packed in one-half dozen boxes.		
Mortise Knob Lock.		
With Occidental Patent Reversible Latch.		
No. 498, 4x3½ in. Brass Front and Strike, Brass Bolts and Hub, Nickel Plated Steel Bit Key, one Tumbler, 21 Changes.....	5-16 Inch Hub.	Per doz. \$14.00
Packed in one-half dozen boxes.		
Mortise Knob Lock.		
3-8 Inch Thick—For Very Thin Doors. Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.		
No. 532, 4½x3½ in. Lacquered Iron Front, Iron Bolt and Strike, Tinned Malleable Iron Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$ 8.00
No. 533, 4½x3½ in. Lacquered Iron Front, Iron Bolt and Strike, Brass Key, one Tumbler.....		9 50
No. 534, 4½x3½ in. Lacquered Iron Front, Brass Bolts, Iron Strike, Brass Key, one Tumbler.....		11 50
Packed in one-half dozen boxes.		
Mortise Knob Locks.		
Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.		
No. 558, 4½x3½ in. Brass Front and Strike, Brass Bolts and Hub, Nickel Plated Steel Bit Key, two Tumblers.....	5-16 Inch Hub.	Per doz. \$14.50
No. 578, 4½x3½ in. Brass Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler, 34 Changes.....		17 50
No. 586, 4½x3½ in. Brass Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler, 34 Changes.....		14 50
No. 603, 5x3½ in. Patent Lever, Brass Front and Strike, Brass Bolts, Brass Key, one Tumbler.....		21 00
Packed in one-half dozen boxes.		
Upright Rim Knob Lock.		
For Very Narrow Slits, Blind Doors.		
No. 761, 8x½ in. Iron Bolt, Hub and Slide Bolt, 21 Changes.....	5-16 Inch Hub.	Per doz. \$ 4.50
Horizontal Rim Dead Locks.		
Ornamental Case. For Right or Left Hand Doors.		
No. 886, 3½x3½ in. Iron Bolt, Nickel Plated Steel Bit Key, one Tumbler, 34 Changes.....		Per doz. \$ 6.25
No. 887, 3½x3½ in. Same as 886, Fancy Bronze Case.....		6 25
No. 887, 3½x3½ in. Iron Bolt, Nickel Plated Steel Bit Key, two Tumblers.....		6 25
No. 887½, 3½x3½ in. Same as 887, Fancy Bronze Case.....		10 25
No. 888, 3½x3½ in. Brass Bolt, Nickel Plated Steel Bit Key, two Tumblers.....		9 50
No. 888½, 3½x3½ in. Same as 888, Fancy Bronze Case.....		11 50
No. 901 4x3½ in. Iron Bolt, Nickel Plated Steel Bit Key, one Tumbler, 34 Changes.....		7 50
No. 901½, 4x3½ in. Same as 901, Fancy Bronze Case.....		9 00
No. 902, 4x3½ in. Iron Bolt, Nickel Plated Steel Bit Key, two Tumblers.....		10 50
No. 902½, 4x3½ in. Same as 902, Fancy Bronze Case.....		12 50
No. 903, 4x3½ in. Iron Bolt, Nickel Plated Steel Bit Key, two Tumblers.....		13 50
No. 903½, 4x3½ in. Same as 903, Fancy Bronze Case.....		14 50
Packed in one-half dozen boxes.		
Upright Rim Dead Lock.		
For Right or Left Hand. For Store Doors, With Nickel Plated Flat Steel Folding Keys.		
No. 1118, 4x3½ in. Heavy Iron Bolt, Two Flat Steel Folding Keys, one Tumbler.....		Per doz. \$23.00
Packed in one-half dozen boxes.		
Upright Rim Knob Lock.		
Ornamental Case. Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.		
No. 1233, 4½x3½ in. Patent Lever, Two Iron Bolts, Nickel Plated Steel Bit Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$9.00
No. 1233½, 4½x3½ in. Same as 1233, Fancy Bronze Case.....		13 00
No. 1236, 4½x3½ in. Patent Lever, Two Iron Bolts, Nickel Plated Steel Bit Key, two Tumblers.....		13 00
No. 1236½, 4½x3½ in. Same as 1236, Fancy Bronze Case.....		16 00
No. 1237, 4½x3½ in. Patent Lever, Two Iron Bolts, Brass Hub, Nickel Plated Steel Bit Key, two Tumblers.....		15 00
No. 1237½, 4½x3½ in. Same as 1237, Fancy Bronze Case.....		19 00
Packed in one-half dozen boxes.		
Upright Rim Knob Locks.		
With Occidental Patent Reversible Latch.		
No. 1340, 4½x3½ in. Two Iron Bolts, Iron Hub with Stop, Tinned Malleable Iron Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$ 7.75
No. 1341, 4½x3½ in. Two Iron Bolts, Iron Hub with Stop, Brass Key, one Tumbler.....		8 25
No. 1344, 4½x3½ in. Two Brass Bolts, Iron Hub with Stop, Brass Key, one Tumbler.....		9 25
Upright Rim Knob Locks.		
Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.		
No. 1367, 4½x3½ in. Patent Lever, Two Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$ 5.50
No. 1367½, 4½x3½ in. Patent Lever, Two Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....		6 50
No. 1368, 4½x3½ in. Patent Lever, Two Iron Bolts, Brass Key, one Tumbler.....		6 75
No. 1368½, 4½x3½ in. Patent Lever, Two Iron Bolts, with Stop, Brass Key, one Tumbler.....		7 00
No. 1369, 4½x3½ in. Patent Lever, Three Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....		6 75
No. 1370, 4½x3½ in. Patent Lever, Two Iron Bolts, Brass Key, one Tumbler.....		6 25
No. 1371, 4½x3½ in. Patent Lever, Two Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....		5 50
No. 1371½, 4½x3½ in. Patent Lever, Two Iron Bolts, with Stop, Tinned Malleable Iron Key, one Tumbler.....		5 75
No. 1372, 4½x3½ in. Patent Lever, Two Iron Bolts, with Stop, Brass Key, one Tumbler.....		7 25
No. 1373, 4½x3½ in. Patent Lever, Three Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....		7 00
No. 1374, 4½x3½ in. Patent Lever, Three Iron Bolts, Brass Key, one Tumbler.....		6 50
Upright Rim Knob Locks.		
Independent Reversible Latch. To Reverse the Hand, swing the Cap and turn over the Latch.		
No. 1301, 4½x3½ in. Patent Lever, Two Iron Bolts, with Stop, Tinned Malleable Iron Key, one Tumbler.....	5-16 Inch Hub.	Per doz. \$6.00
No. 1323, 4½x3½ in. Patent Lever, Two Iron Bolts, with Stop, Brass Key, one Tumbler.....		7 50
Upright Rim Knob Locks.		
Occidental Patent Reversible Latch, Ornamental Case, with Thin Bit Keys.		
No. 1311, 4½x3½ in. Two Iron Bolts, Iron Hub, Nickel Plated Steel Bit Key, one Tumbler, 34 changes.....	5-16 Inch Hub.	Per doz. \$10.00

* Nos. 1367, 1368, 1369, 1370 have been improved by putting in a Patent Lever Spring.

No. 1311 $\frac{3}{4}$, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Same as 1311, Fancy Bronze Case.....	14.00
No. 1312 $\frac{3}{4}$, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Same as 1312, Fancy Bronze Case.....	16.50
No. 1313 $\frac{3}{4}$, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Same as 1313, Fancy Bronze Case.....	18.50
No. 1314 $\frac{3}{4}$, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Same as 1314, Fancy Bronze Case.....	21.50
Nos. 1312, 1313, 1314 are now made with Ornamental Cases.	
Horizontal Rivn Knob Locks.	
Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.	
5-16 Inch Hub. Per doz.	
No. 1502, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Lever Spring, Two Iron Bolts, with Stop, Iron Hub, Tinned Malleable Iron Key, One Tumbler.....	\$5 75
No. 1503, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Lever Spring, Two Iron Bolts, with Stop, Iron Hub, Brass Key, One Tumbler.....	7 25
No. 1507, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Lever Spring, Three Iron Bolts, Iron Hub, Tinned Malleable Iron Key + No. 1508, 4 $\frac{1}{2}$ x3 $\frac{3}{4}$ in. Lever Spring, Three Iron Bolts, Iron Hub, Brass Key, One Tumbler.....	8 00
Refrigerator Knobs. Per doz.	
No. 292, Mineral, Japanned Mountings.....	\$2.00
No. 293, Porcelain, Japanned Mountings.....	2 75
No. 294, Porcelain, Plated Mountings.....	6 50
Ornamental Door Knobs. Per doz.	
5-16 Inch Spindle.	
No. 316, 2 $\frac{1}{2}$ in. Porcelain, with Round Ornamental Norwalk Bronze Rose (Mortise).....	\$4.00
No. 317, 2 $\frac{1}{2}$ in. Porcelain, with Round Ornamental Norwalk Bronze Rose (Rim).....	4 00
No. A, 3, 2 $\frac{1}{2}$ in. Silica, with Round Fancy Ornamental Bronze Rose (Mortise).....	9 00
Ornamental Bell Pulls. Per doz.	
No. 456, 1 $\frac{3}{4}$ in. Porcelain, with Round Ornamental Norwalk Bronze Rose.....	\$4.50
No. 466, 1 $\frac{3}{4}$ in. Silica, with Round Silica Rose.....	10 00
No. 467, 1 $\frac{3}{4}$ in. Silica, with Round Fancy Ornamental Bronze Rose.....	8 00
Ornamental Key Escutcheons. Per doz.	
No. 850, 13-16 in. Ornamental Norwalk Bronze, for Solid Brass Keys.....	\$0.50
No. 855, 13-16 in. Ornamental Norwalk Bronze, for Steel Bit Keys.....	75
No. 860, 13-16 in. Ornamental Fancy Bronze, for Solid Brass Keys.....	65
No. 865, 13-16 in. Ornamental Fancy Bronze, for Steel Bit Keys.....	65
No. 900, Double Key Hole, Ornamental Fancy Bronze, Silica Door, with Night Key Hole, for Locks Nos. 390, 295, 300, 345.....	8 00
We invite the attention of capital seeking investment to the advertisement of "Special," on page 20. This is a good opportunity to invest in a well-established and respectable manufacturing business.	
BRITISH IRON MARKET.	
(Specially reported by cable for The Iron Age.	
WEDNESDAY, July 21, 1875.	
Scotch Pig. —The demand has fallen off, and but a small business is doing. Makers' prices remain unaltered as follows:	
Coltness No. 1.....	68/6
Garthsherrrie No. 1.....	68/6
Glengarnock No. 1.....	67/6
Eglinton No. 1.....	62/6
Manufactured Iron and Rails remain without change.	
IRON.	
American Pig. —The prevailing dullness which has characterized this branch of industry for so long a time past still continues, and any encouraging symptoms appear to be as far in the future as they did months ago. Occasionally advices come to hand from other sections which appear to indicate a trifling revival of trade, but it is only spasmodic, and generally followed by a duller feeling than before. At this market there is scarcely an encouraging feature. Buyers do not evince any disposition to operate, unless compelled to fill some pressing order, and limit their purchases to just the quantity wanted. Little, if any, change can be made in prices, though an actual buyer could, without doubt, pick up what he wanted from second hands on very liberal terms. The more prominent Lehigh companies, however, maintain a bold front, and, as a rule, refuse decidedly to consider bids below their ideas. The production is still only on a moderate scale, and some makers appear inclined to blow out altogether rather than submit to further reduction in values. The few transactions that have taken place have been unimportant, and as the terms in all cases are kept private, it is useless to mention them. We quote: No. 1 Foundry, \$36 @ \$38; No. 2 Foundry, \$35 @ \$36; Gray Forge, \$23 @ \$25; White and Mottled, \$21 @ \$22.	
Scotch Pig. —Scarcely anything has been done in Scotch Iron the past week, beyond a few jobbing lots of 10 to 50 tons each, which have been on a basis of ruling prices. Values of large lots are nominal and uncertain, though holders talk pretty steady in the face of the light supply here. Cable offers are still being received to lay stock down here at current values, but importers discourage shipments, in the present stagnation of trade. We quote nominally, Coltness, \$31.50 @ \$32; Glengarnock, \$32.50 @ \$33; Garthsherrrie, \$31.50 @ \$33; Eglinton, \$30 @ \$31.	
Bar. —Manufactured continues quiet and without new features to note. We quote Refined Bar at Mill at 2-6c. @ 2-8c.	
Rails. —The general inquiry for New Rails continues moderate, though holders are inclined to be steady in their views for stock of recent production. Some lots, manufactured some time ago, it is said, could be obtained at a shade concession for cash. Steel Rails are quiet and unchanged. We note sales of 1300 tons English, in bond for Canada, on private terms. We quote at \$47 @ \$50, at the mills, for American, currency, and \$48 @ \$50, gold, for Welsh.	
Old Rails. —Trade still rules rather quiet for Old, though an occasional inquiry is heard of, without, however, resulting in any transactions of importance. We quote at \$36 @ \$38.50.	
Scrap. —There was a free movement in Scrap Iron early in the week, and sales reported of 1500 lots—said to be about all the stock here—for shipment to Fall River. The price was not definitely mentioned, but generally supposed to have been in the neighborhood of \$32. Later, trade has ruled quiet, but prices are held firmer, and with confidence. We quote at \$32 @ \$32.50.	
* Nos. 1502 and 1508 have been improved by putting in Lever Spring, and Stop to Latch Bolt.	
* Nos. 1507 and 1508 have been improved by putting in Lever Spring, and Stop to Latch Bolt.	

Copper.—Sales for the week under review sum up between 200,000 and 300,000 pounds Lake Superior at 23c., and, in some instances, a shade under. To-day 23c. was paid, and holders now ask 23½c. A good many manufacturers have of late bought small parcels, and there is evidently a growing desire to do business. The almost uninterrupted decline in the gold premium has not had the effect of weakening the price of Copper; the reason why gold is drooping is well known to the trade at large, and favorably interpreted. Our crops are abundant, while those of Europe are short; we shall do a large and profitable export trade, which will spread prosperity among consumers, especially in our vast agricultural regions, thereby stimulating general business. Metals and their manufactures will have a good share in the better times thus drawing near. Even granting that in the grain and gold market all this may be largely discounted and exaggerated at first, the tendencies are manifest, and spread greater confidence in the future. In Europe, on the contrary, the outlook is not cheerful, if dear bread is to be added to the labor troubles which are looming up at intervals. Nothing has transpired in our midst in Copper futures, which are 23½c., September delivery, asked. Baltimore Copper is scarce at 23c., with small sales; 23½c. asked. The manufactures of Copper are well sustained as follows: New Copper Sheathing, 30c.; Bolts and Braziers, 31c.; Bronze and Yellow Metal Sheathing, 22c.; and Bolts, 28c.

Tin.—The following cablegrams have come to hand to-day, one from London: "Market dull; holders pressing sales; Straits, 478;" and, yesterday, one from Singapore: "Malacca Tin, \$21.25 per picul." One of the facts that have come to light about Tin production through recent mail accounts from the British Tin settlements is to the effect that the Larote district, on the peninsula of Malacca, whose population during the troubles there, a year or two ago, had dwindled down to a mere trifle, is now rapidly attracting Chinese immigrants once more. On the number of Chinese available for mining purposes, the productiveness of the district depends. There are thirty old mines, producing 100 piculs each monthly, and a few new ones, each capable of producing 50 piculs per month. Should the 120 mines be made to produce together, the total annual product would be 79,200 piculs, which would be about 50 per cent. more than the actual production of Banca, which is something like 52,000 piculs per annum. These are the estimates, and should they prove to be correct, the Chinese will be able to buy for Tin to recover in value permanently. We have been quiet here, with a fair jobbing trade doing, and quote large parcels in gold as follows: Straits, 184½; English Refined, 19c.; Common do., 189½c.; and Banca, 23c. Tin Plates have been rather weaker, but sales have aggregated 5000 boxes for the month, at a price of 2½ a box. Demand. We quote large lots as follows: Charcoal Bright, \$9.12½ @ \$9.25, gold, per box; do. Terne, \$7.37½ @ \$7.50; Coke Tin, \$6.75 @ \$7; and do. Terne, \$6.75, all gold.

(Specially reported by cable for *The Iron Age*.)

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† Nos. 1507 and 1508 have been improved by putting in Lever Spring.

COAL.

The market for Anthracite Coal is fairly active, and supplies are daily increasing—running

close upon 500,000 tons per week. Monthly circulars have been issued for August, according to the Associates Coal Companies' pro-

gramme, which advances the price of Anthracite Coal 10 cents per ton. Cumberland Coal is in good supply and meets with a fair trade

The following are the prices charged by the Delaware and Hudson Canal Company for coal deliverable f. o. b. vessel at Rondout

Coal, deliverable U. S. S. vessel at Rondout during the month of August, per ton of 2240 lbs:

Furnace, Lamp.....	\$5.00
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Steamer, Lump.....	5'10
Grate.....	5'20
Egg.....	5'45
Stove.....	5'90
Chestnut.....	4'90

The quantity of coal sent from the Schuylkill region the last week was by rail 98,174 tons ; canal, 20,633 tons ; for the week, 118,807

The supply sent from all the regions for the

week was, Anthracite, 430,441 tons; Bituminous, 72,452; for the week, 502,893 tons, against 514,590 tons for the corresponding week last year. Decrease 11,697 tons.

The supply sent from all the regions so far this year foots up 8,965,157 tons, against 19,472,621 tons to same period last year. De-

crease, 3,497,464 tons. The decrease in Anthracite is 3,610,021 tons.

No.	Per doz.	No.	Per doz.	No.	Per doz.	No.	Per doz.	No.	Per doz.
895	48.00	842	22.50	1300	6.00	311	4.50	363	75.00
896	48.00	843	22.50	1301	6.00	312	4.50	364	75.00
897	48.00	844	22.50	1302	6.00	313	4.50	365	75.00
898	48.00	845	22.50	1303	6.00	314	4.50	366	75.00
899	48.00	846	22.50	1304	6.00	315	4.50	367	75.00
900	48.00	847	22.50	1305	6.00	316	4.50	368	75.00
901	48.00	848	22.50	1306	6.00	317	4.50	369	75.00
902	48.00	849	22.50	1307	6.00	318	4.50	370	75.00
903	48.00	850	22.50	1308	6.00	319	4.50	371	75.00
904	48.00	851	22.50	1309	6.00	320	4.50	372	75.00
905	48.00	852	22.50	1310	6.00	321	4.50	373	75.00
906	48.00	853	22.50	1311	6.00	322	4.50	374	75.00
907	48.00	854	22.50	1312	6.00	323	4.50	375	75.00
908	48.00	855	22.50	1313	6.00	324	4.50	376	75.00
909	48.00	856	22.50	1314	6.00	325	4.50	377	75.00
910	48.00	857	22.50	1315	6.00	326	4.50	378	75.00
911	48.00	858	22.50	1316	6.00	327	4.50	379	75.00
912	48.00	859	22.50	1317	6.00	328	4.50	380	75.00
913	48.00	860	22.50	1318	6.00	329	4.50	381	75.00
914	48.00	861	22.50	1319	6.00	330	4.50	382	75.00
915	48.00	862	22.50	1320	6.00	331	4.50	383	75.00
916	48.00	863	22.50	1321	6.00	332	4.50	384	75.00
917	48.00	864	22.50	1322	6.00	333	4.50	385	75.00
918	48.00	865	22.50	1323	6.00	334	4.50	386	75.00
919	48.00	866	22.50	1324	6.00	335	4.50	387	75.00
920	48.00	867	22.50	1325	6.00	336	4.50	388	75.00
921	48.00	868	22.50	1326	6.00	337	4.50	389	75.00
922	48.00	869	22.50	1327	6.00	338	4.50	390	75.00
923	48.00	870	22.50	1328	6.00	339	4.50	391	75.00
924	48.00	871	22.50	1329	6.00	340	4.50	392	75.00
925	48.00	872	22.50	1330	6.00	341	4.50	393	75.00
926	48.00	873	22.50	1331	6.00	342	4.50	394	75.00
927	48.00	874	22.50	1332	6.00	343	4.50	395	75.00
928	48.00	875	22.50	1333	6.00	344	4.50	396	75.00
929	48.00	876	22.50	1334	6.00	345	4.50	397	75.00
930	48.00	877	22.50	1335	6.00	346	4.50	398	75.00
931	48.00	878	22.50	1336	6.00	347	4.50	399	75.00
932	48.00	879	22.50	1337	6.00	348	4.50	400	75.00
933	48.00	880	22.50	1338	6.00	349	4.50	401	75.00
934	48.00	881	22.50	1339	6.00	350	4.50	402	75.00
935	48.00	882	22.50	1340	6.00	351	4.50	403	75.00
936	48.00	883	22.50	1341	6.00	352	4.50	404	75.00
937	48.00	884	22.50	1342	6.00	353	4.50	405	75.00
938	48.00	885	22.50	1343	6.00	354	4.50	406	75.00
939	48.00	886	22.50	1344	6.00	355	4.50	407	75.00
940	48.00	887	22.50	1345	6.00	356	4.50	408	75.00
941	48.00	888	22.50	1346	6.00	357	4.50	409	75.00
942	48.00	889	22.50	1347	6.00	358	4.50	410	75.00
943	48.00	890	22.50	1348	6.00	359	4.50	411	75.00
944	48.00	891	22.50	1349	6.00	360	4.50	412	75.00
945	48.00	892	22.50	1350	6.00	361	4.50	413	75.00
946	48.00	893	22.50	1351	6.00	362	4.50	414	75.00
947	48.00	894	22.50	1352	6.00	363	4.50	415	75.00
948	48.00	895	22.50	1353	6.00	364	4.50	416	75.00
949	48.00	896	22.50	1354	6.00	365	4.50	417	75.00
950	48.00	897	22.50	1355	6.00	366	4.50	418	75.00
951	48.00	898	22.50	1356	6.00	367	4.50	419	75.00
952	48.00	899	22.50	1357	6.00	368	4.50	420	75.00
953	48.00	900	22.50	1358	6.00	369	4.50	421	75.00
954	48.00	901	22.50	1359	6.00	370	4.50	422	75.00
955	48.00	902	22.50	1360	6.00	371	4.50	423	75.00
956	48.00	903	22.50	1361	6.00	372	4.50	424	75.00
957	48.00	904	22.50	1362	6.00	373	4.50	425	75.00
958	48.00	905	22.50	1363	6.00	374	4.50	426	75.00
959	48.00	906	22.50	1364	6.00	375	4.50	427	75.00
960	48.00	907	22.50	1365	6.00	376	4.50	428	75.00
961	48.00	908	22.50	1366	6.00	377	4.50	429	75.00
962	48.00	909	22.50	1367	6.00	378	4.50	430	75.00
963	48.00	910	22.50	1368	6.00	379	4.50	431	75.00
964	48.00	911	22.50	1369	6.00	380	4.50	432	75.00
965	48.00	912	22.50	1370	6.00	381	4.50	433	75.00
966	48.00	913	22.50	1371	6.00	382	4.50	434	75.00
967	48.00	914	22.50	1372	6.00	383	4.50	435	75.00
968	48.00	915	22.50	1373	6.00	384	4.50	436	75.00
969	48.00	916	22.50	1374	6.00	385	4.50	437	75.00
970	48.00	917	22.50	1375	6.00	386	4.50	438	75.00
971	48.00	918	22.50	1376	6.00	387	4.50	439	75.00
972	48.00	919	22.50	1377	6.00	388	4.50	440	75.00
973	48.00	920	22.50	1378	6.00	389	4.50	441	75.00
974	48.00	921	22.50	1379	6.00	390	4.50	442	75.00
975	48.00	922	22.50	1380	6.00	391	4.50	443	75.00
976	48.00	923	22.50	1381	6.00	392	4.50	444	75.00
977	48.00	924	22.50	1382	6.00	393	4.50	445	75.00
978	48.00	925	22.50	1383	6.00	394	4.50	446	75.00
979	48.00	926	22.50	1384	6.00	395	4.50	447	75.00
980	48.00	927	22.50	1385	6.00	396	4.50	448	75.00
981	48.00	928	22.50	1386	6.00	397	4.50	449	75.00
982	48.00	929	22.50	1387	6.00	398	4.50	450	75.00
983	48.00	930	22.50	1388	6.00	399	4.50	451	75.00
984	48.00	931	22.50	1389	6.00	400	4.50	452	75.00
985	48.00	932	22.50	1390	6.00	401	4.50	453	75.00
986	48.00	933	22.50	1391	6.00	402	4.50	454	75.00
987	48.00	934	22.50	1392	6.00	403	4.50	455	75.00
988	48.00	935	22.50	1393	6.00	404	4.50	456	75.00
989	48.00	936	22.50	1394	6.00	405	4.50	457	75.00
990	48.00	937	22.50	1395	6.00	406	4.50	458	75.00
991	48.00	938	22.50	1396	6.00	407	4.50	459	75.00
992	48.00	939	22.50	1397	6.00	408	4.50	460	75.00
993	48.00	940	22.50	1398	6.00	409	4.50	461	75.00
994	48.00	941	22.50	1399	6.00	410	4.50	462	75.00
995	48.00	942	22.50	1400	6.00	411	4.50	463	75.00
996	48.00	943	22.50	1401	6.00	412	4.50	464	75.00
997	48.00	944	22.50	1402	6.00	413	4.50	465	75.00
998	48.00	945	22.50	1403	6.00	414	4.50	466	75.00
999	48.00	946	22.50	1404	6.00	415	4.50	467	75.00
1000	48.00	947	22.50	1405	6.00	416	4.50	468	75.00

Mortise Knob Locks.

Right or Left Hand. To Reverse the Hand, take off the Cap and turn over the Latch.

5-16 inch Hub.		Per doz.
o. 412, 3¼x3 in. Patent Lever, Lacquered Iron Front and Strike, Iron Bolts, Tinned Malleable Iron Key, one Tumbler.....		\$6.00
o. 418, 3¼x3 in. Patent Lever, Lacquered Iron Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		7-50
o. 422, 3¼x3 in. Patent Lever, Lacquered Iron Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		9-50
o. 428, 3¼x3 in. Patent Lever, Lacquered Iron Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		13-50
o. 432, 3¼x3 in. Patent Lever, Brass Front and Strike, Brass Bolts, Nickel Plated Steel Bit Key, one Tumbler.....		12-50
o. 438, 3¼x3 in. Patent Lever, Brass Front and Strike, Brass Bolts and Key, one Tumbler.....		10-50
o. 496, 4x3½ in. Brass Front and Strike, Brass Bolts and Hub, Nickel Plated Steel Bit Key, one Tumbler.....		13-50
Packed in one-half dozen boxes.		

THE SCOTCH IRON TRADE.
A very much better feeling pervaded the Scotch pig iron market during the whole of last week, there being, to a certain extent, a return of confidence after the panic, which was produced by the rapid succession of failures to which detailed allusion has previously been made in *The Age*. Warrants have gone up to about 60/9 for first quality, with a disposition toward slightly better terms on the part of sellers. *Makers'* brands have also stiffened, and are now some 1/ or 2. higher in price than last week.

week. It is rumored that some of the iron masters contemplate blowing out furnaces, and it is cited, as an instance in point, that four have already been blown out at the Calder Works. Freight is also the price of the pig iron. Writing on July 2d from Glasgow, Messrs. James Watson & Co. said: "The market for Scotch pig iron has been very firm during the week at advanced quotations. Business has been done in warrants from 59 1/2 to 61 1/2 cash, closing to-day buyers at 60 1/2; sellers, 60 7/8. Shipments last week were 13,101 tons, against 6415 tons in the corresponding week of 1874. We quote:

	No. 1.	No. 2.
G. M. B., at Glasgow.....	62 1/2	61 1/2
Gartsherrie.....	67 1/2	62 1/2
Coltness.....	69 1/2	65 1/2
Summerlee.....	66 1/2	62 1/2
Langloan.....	67 1/2	62 1/2
Carbros.....	67 1/2	62 1/2
Calder, at Port Dundas.....	68 1/2	62 1/2
Glenarnock, at Ardrossan.....	68 1/2	62 1/2
Eglinton.....	62 1/2	61 1/2
Dalmellington.....	61 1/2	60 1/2
Shotts, at Leith.....	68 1/2	61 1/2
Kinnell, at Boness.....	65 1/2	59 1/2

Messrs. John E. Swan & Bros., prices current, of same place and date, gives the following prices:

Glasgow Brands.	Furnaces	Bying	118	Furnaces	Bying	118	Prices.
							No. 1. No. 2. No. 4.
Gartsherrie.....	13	3	16	63 1/2	62 1/2	63 1/2	
Coltness.....	12	0	12	69 1/2	64 1/2	64 1/2	
Summerlee.....	6	2	8	66 1/2	62 1/2	64 1/2	
Langloan.....	7	1	9	67 1/2	62 1/2	64 1/2	
Carbros.....	4	2	6	67 1/2	62 1/2	64 1/2	
Calder.....	5	2	7	68 1/2	62 1/2	64 1/2	
Shotts (Bessmer).....	5	2	7	82 1/2	64 1/2	64 1/2	
Carbros.....	4	2	6	63 1/2	61 1/2	64 1/2	
Wishaw.....	2	1	3	62 1/2	61 1/2	60 1/2	
Monkland.....	9	0	9	62 1/2	61 1/2	60 1/2	
Chapelhall.....	6	0	6	64 1/2	61 1/2	60 1/2	
Clyde.....	4	1	5	62 1/2	61 1/2	60 1/2	
Quarter-Clyde.....	4	1	5	62 1/2	61 1/2	60 1/2	

* f. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 2, g. m. b., 40 1/2.

WEST COAST BRANDS—f. o. b. Ardrossan.	Furnaces	Bying	118	Furnaces	Bying	118	Prices.
							No. 1. No. 2. No. 4.
Glenarnock.....	7	2	9	68 1/2	62 1/2	63 1/2	
Ardrossan.....	4	1	5	62 1/2	61 1/2	60 1/2	
Eglinton.....	6	0	6	62 1/2	61 1/2	60 1/2	
Langloan.....	4	2	6	62 1/2	61 1/2	60 1/2	
Muirkirk.....	3	0	3	62 1/2	61 1/2	60 1/2	
Portland.....	3	3	6	61 1/2	60 1/2	60 1/2	
Dalmellington.....	6	2	8	61 1/2	60 1/2	60 1/2	

EAST COAST BRANDS—f. o. b. in the Forth.	Furnaces	Bying	118	Furnaces	Bying	118	Prices.
							No. 1. No. 2. No. 4.
Kinnell.....	3	1	4	62 1/2	59 1/2	59 1/2	
Almond.....	2	1	3	62 1/2	59 1/2	59 1/2	
Carron (Bessmer).....	5	1	6	67 1/2	61 1/2	61 1/2	
Lochgelly.....	1	3	4	62 1/2	59 1/2	59 1/2	
Lampburn.....	0	2	2	62 1/2	59 1/2	59 1/2	
Bridgess.....	0	2	2	62 1/2	59 1/2	59 1/2	

Furnaces in blast in Scotland, July 9, 1875—118.

Messrs. Wm. Colvin & Co. (Glasgow, July 6) say: "Since the date of our last report the warrant market has been very steady. The extreme prices touched have been 60 3/4 and 61 1/4, but a great proportion of the business has been done from 60 1/2 to 60 9/10. To-day a few lots have been done at 60 9/10 and 60 10/16, closing with buyers at 60 9/10. The shipping returns are good, and makers' prices remain steady at the late advance. We quote:

Deliverable alongside.	No. 1.	No. 2.
G. M. B., at Glasgow.....	62 1/2	60 1/2
Gartsherrie.....	67 1/2	62 1/2
Coltness.....	69 1/2	65 1/2
Summerlee.....	66 1/2	62 1/2
Langloan.....	67 1/2	62 1/2
Carbros.....	67 1/2	62 1/2
Monkland.....	62 1/2	61 1/2
Clyde.....	64 1/2	61 1/2
Govan, at Broomielaw.....	63 1/2	61 1/2
Calder, at Port Dundas.....	68 1/2	62 1/2
Glenarnock, at Ardrossan.....	68 1/2	62 1/2
Eglinton.....	62 1/2	61 1/2
Dalmellington.....	61 1/2	60 1/2
Carron, at Grangemouth, selected.....	67 1/2	61 1/2
Shotts, at Leith.....	68 1/2	64 1/2
Kinnell, at Boness.....	62 1/2	60 1/2
By Iron.....	58 1/2 to 59 1/2	59 1/2 to 60 1/2
Nail Rods.....	59 1/2	59 1/2

SHIPMENTS.	Tons.
Week ending July 3, 1875.....	14,101
July 4, 1874.....	6,112
Increase.....	7,989
Total increase for 1875.....	72,854

TRADES OF SHEFFIELD.

The old story has again to be told, there being no change whatever in the general state of trade here since my last communication was penned. All departments in every branch of the iron and steel industries are reported quiet, and the most diligent inquiry, accompanied by careful observation of visible facts, fails to discover any movement worthy of being recorded in an upward direction. Many of the leading iron and steel works are certainly running three to four days weekly, but it is plain that the orders on hand in several departments are neither large nor numerous, seeing that only single shifts are being worked. Most of the blast furnaces of the district are blowing, but it is believed that at more than one establishment very heavy stocks of pig iron are held.

I notice that a district newspaper states that the Midland Iron Company's Works, near Rotherham, are at an entire standstill, owing to the absence of orders at remunerative prices, and are likely to remain so for some weeks to come. "Up to a week back," adds the same journal, "these works were about the best employed in the district." I am not prepared to endorse the whole of this statement, but I believe the works are standing—whether for stock taking purposes or not I am not able to state. It may be mentioned, however, that the Midland Iron Company has for several years paid the best dividend of all the local iron companies—a fact partly owing to its comparatively small capital—and is managed by a most practical board of directors. At two or three other large iron-works near Sheffield and Rotherham the major parts of the machinery are laid off, and many workmen are consequently thrown wholly or partially out of employment. A tolerably large tonnage of North Lincolnshire and Northamptonshire ironstone and ores is being brought into this neighborhood, several local furnaces being exclusively supplied with these materials. At Renshaw and some other Derbyshire establishments, ironstone of excellent quality is obtainable almost on the spot, its presence in each close contiguity to the coal supply rendering it of great value. Pig iron is not much altered in value from last week's prices. The following are current quotations for hematite pigs: "Maryport 'hematite,' No. 3, 82; No. 4, 82; No. 5, mottled and white, 81 1/2 to 82; 'Bessmer,' No. 1, 84; No. 2, 82; and No. 3, 82—all per ton, with 2 1/2 off for prompt cash. "Mildon 'Bessmer,' No. 1, 90; No. 2, 87 1/2; No. 3, 85; 'ordinary,' No. 3, 85; No. 4, 84; No. 5, 90; mottled, 95; and white, 90, on the usual four months' terms, or with the customary discount for prompt payments in cash. In consequence of the Spanish mines being still to a great extent non-productive, a good deal of hematite ore is now being imported from Eba and Algiers for use at the Bessmer

Works here and in other parts of the country. Ores of these descriptions can be bought on the spot at very low prices, and the freight being some 7 or 8 per ton only, it follows that it is far cheaper to import them than to use British ores of the same class. The general cast-steel trade is not quite so well employed as it was a fortnight or so back, orders having been worked off without having been replaced. Advances from New York of recent date state that trade is excessively dull, and that there is some difficulty in ascertaining whether it is safe to deliver even such few small lots as are sold. I have also private letters from English travelers at Quebec and Montreal, stating that trade in the Dominion is anything but brisk, that there is more competition than ever, and that the American edge tool, shovel, etc., makers can "run our makers out" of that market by selling goods made from Sheffield steel.

Davy Brothers & Co., limited, have declared a dividend of 15 per cent. for the year. The strike at the Denaby Main Colliery has at length been amicably arranged, and the men have now resumed work. The coal trade remains exceedingly quiet, and a further reduction in prices will probably be announced a day or two later than this.

In cutlery, manufacturers are, as a rule, doing a steady but very quiet business. Many of them complain strongly of the marked absence of orders from the United States, but not a few have been led thereby to cultivate other markets with a sufficient amount of success to compensate, in an inferior degree, for the abstraction of the American favors. France is a very good customer for many descriptions of our best and medium cutlery, a large order for high class razors, for instance, being now in course of execution by a local firm for one of the best buyers in Rouen. Belgium, too, frequently forwards some capital favors for table cutlery, razors, &c., the principal center of distribution being, as is naturally to be expected, Liege. Australia is also buying table cutlery very freely, much of it being on "speculation."

NEW RATES OF POSTAGE.

These came into force on July 1-4, and as business men may wish to have the information in some readily accessible place, I quote here some of the principal alterations, premising that the new rates affect all States in the postal union, except France, where they do not take effect until January, 1876: The union comprises the whole of the European States, the United States of America and Egypt. The international scale of postage from the 1st of July will be 2 1/2 d. per half-ounce for letters; 1 1/2 d. for post cards; 1 d. per four ounces for newspapers, and 1 d. per two ounces for printed papers, patterns, and legal and commercial documents. The following additional particulars will be interesting: By France the rates range from 2 1/2 d. to 6 d. per half-ounce for letters; 1 1/2 d. to 3 1/2 d. for post cards; 1 d. to 2 d. for newspapers; 1 d. to 2 d. for printed papers, &c. In Germany and the United States the new tariff shows a reduction from 3 d. to 2 1/2 d. on half-ounce letters; for Russia, Sweden and Norway, from 5 d. to 2 1/2 d.; for Portugal and Italy, from 6 d. to 2 1/2 d.; for Egypt, from 10 d. to 2 1/2 d.; and for Alexandria, from 8 d. to 2 1/2 d. Registration will be available in all cases at the uniform rate of 4 d. per letter. The notice gives a detailed definition of printed papers, legal and commercial documents and patterns of merchandise. Under "printed papers" are included stitched or bound books, pamphlets, music, visiting cards, circulars, catalogues, prospectuses, announcements of various kinds and photographs. These must contain no writing, figure or mark beyond a stroke calling attention to a particular passage.

TRADES OF BIRMINGHAM AND STAFFORDSHIRE.

Here, as elsewhere, matters are necessarily stagnant, and an expectant attitude is the one taken by all classes of those who deal in "cold iron." The iron trade prospects are believed to have been greatly improved by the reduction of 2 1/2 per ton in the price of thick furnace coal on and after July 1st, which has been declared by Earl Dudley and other leading coal owners in the district. This reduction is not only valuable per se, but is of further service, inasmuch as upon it the coal owners have based an attack upon the colliers' wages to the extent of sixpence per day on the thick-coal men's pay and threepence per day on those working the thin seams. These steps will, or ought to, afford a great measure of relief to the iron masters, so that those who look forward to the drop in prices have pretty good grounds whereon to found their suppositions. What the amount of the drop in finished iron will be, of course, yet to be ascertained. It will, however, in all probability be 2 1/2 per ton, seeing that the reduction in coal alone of the extent just named means a saving of 16 to 18 per ton on the finished iron. The hardware industries of Birmingham and the "Dark" country generally remain fairly well engaged, many houses being now working out orders for goods needed for the current seaside season, and also for shipping to distant markets. The Birmingham Screw Company (limited) announced by circular on Friday last that they have reduced the price of the improved patent pointed iron wood screw by increasing the discount to 60 per cent. I do not hear of any other noteworthy alteration in prices—not at any rate in the quotations of export goods.

TRADE OF SOUTH WALES.

A communication from South Wales states that the Plymouth Iron Works are at a complete standstill, even to the puddling furnaces. The collieries are, however, being worked pretty fully, there being at present an output at the rate of about 5000 tons weekly. It is said that many of the local creditors of the Plymouth and Aberdare concerns are in favor of a composition. Mr. Fothergill may be enabled to restart with energy and means sufficient to carry out reforms in the works which are now but half complete. A good deal of business is said to be observable at Dowlais. A little is being done at Landore and at B'nanvon, both being surpassed in activity by Rhymney. The Colliery Works at Llandaff are busy, but the Treforest establishment is not just now producing much iron. Rumors of embassments are again current, one of the principal Welsh companies being said to be almost in extremis.

THE METAL MARKETS.

have been very quiet indeed. In copper next to nothing has been done in London. On Wednesday, Chili bars were nominally held at £81. 10 to £82. 10, without business resulting. On Thursday 25 tons, g. o. b., were quoted £81. 10; 25 tons Minemet & Swansea, £82. 7 1/2, whilst Australian was unchanged. On Wednesday tin was dull, 5 tons only of Straits being sold at £82. 10, and 10 tons August and September shipment at £82. Australian was quoted same day at £80 to £81. On Thursday afternoon tin was again quiet, Straits, spot, being £82. 10, and forward £82. Australian being nominally a little weaker, at £80. In spelter no sales have taken place, and lead has throughout the week remained "heavy" and dull at £22 for ordinary. The Mining Journal remarks: "Copper.—There has been very little doing in this metal during the week, and the price of foreign has hardly fluctuated. Lead.—The market for this metal is very inanimate. Good soft English pig is quoted £21. 10 to £22; and soft Spanish, without silver, £21 to £21. 10. Spelter.—The demand is sluggish, and ordinary Silesian is quoted £23. 15 to £24. Stock in London, June 30, 85 tons. Tin.—The market opened

quiet, with Straits at £83. 10, and throughout the week very little has been done, and the tendency has been to easier quotations. Small parcels of Straits tin have changed hands at £82, cash, and at about the same price for August and September delivery. To-day's sales have been made at £81 10, both for spot and arrival. Australian has ruled at £80 to £81, and now quoted at 20/ less. Peruvian, £70 to £73."

Messrs. Berger Spence & Co.'s circular of July 7th says: "In copper some business has been done at a fresh reduction. The value of tin has apparently not yet done falling, and waiting further concessions which will no doubt shortly be obtainable, the demand continues extremely restricted. In lead business has

somewhat improved, and the downward tendency in value appears checked for the present. Spelter commands firmly its previous rate. The Swansea import of copper produce during the quarter ended June 30th, was 10,000 tons ore and 5801 tons regulus. At the five sales held during the same period 6260 tons were transferred, the proceeds realized being £82,793. The stock of produce remaining unsold at the end of the quarter represented 2020 tons of fine copper. The shipments of Scotch iron for the last week were 13,101 tons, against 6415 in 1874."

GRANT & CO., Newark, N. J.
Cap Rifles & Targets.

"WEYMOUTH'S PATENT" Lightning HAY KNIFE,

Manufactured only by
HIRAM HOLT & CO.,
East Wilton, Franklin Co., Me.

The Lightning Hay Knife is a perfect success, and is acknowledged by all who have tested its merits to be the **BEST HAY KNIFE** in use.

It combines the qualities of cutting **EASY, FAST AND WELL** and is a labor saving instrument.

The blade of this knife is **Solid Cast Steel** of such strength and temper as the tests require. It has the **Spear Point**, which enables it to enter the substance to be cut easily and in any direction desired.

The most valuable point in its construction is the **SERRATED EDGE**, being sharp only on the short angle, which comes obliquely in contact with the hay, at the downward motion, giving a drawing cut, which is the true principle of cutting hay.

The cutting surface being small it is kept in order much easier than the old smooth edge knife.

The handles (as seen in the cut) are so arranged that the operator can stand erect, and, having the use of both hands in applying his strength directly upon the knife, can, with ease, CUT TWO FEET IN DEPTH, AND TEN FEET IN LENGTH IN STACK OR MOW, IN ONE MINUTE.

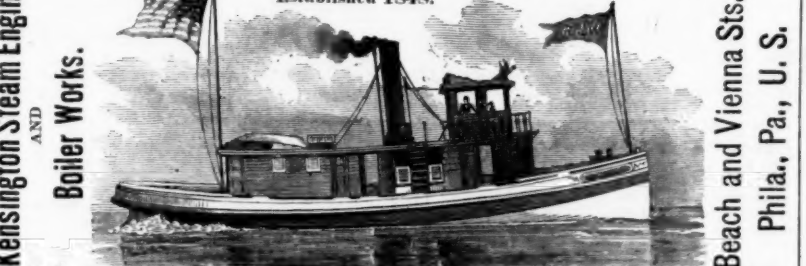
It is not only valuable as a Hay Knife for dividing stacks and mows, but is a superior instrument for cutting hay from the bale, stack or mow, and corn stalks into fine feed, thus doing the work of hay cutters much faster than any other hay cutter in use. It also stands unrivaled by any implement yet invented in cutting peat, turf and muck, and ditching in marshes and meadows.

This knife, although a late invention, is fast taking the place of all other hay knives, and only requires testing to be adopted as the only hay knife which gives

PERFECT SATISFACTION.

It has received several first premiums and medals at the New England State Fairs, among which is a **Silver Medal** from Maine State Fair, 1874.

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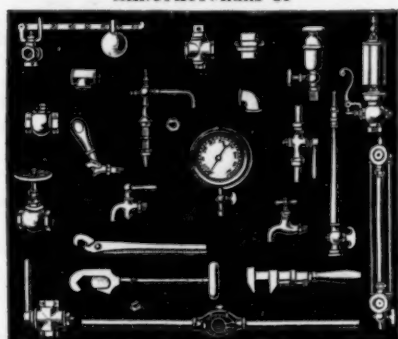
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Angular Belting and Pullies made to order.

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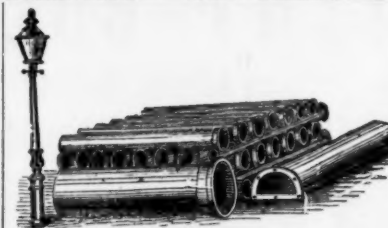
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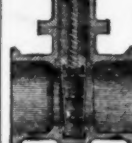
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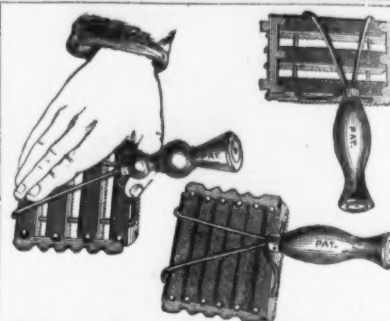
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less wire comb. The result of a long series of ex-
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ments of a Perfect Comb. It is better, stronger, and
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viz: a rest and brace for the thumb, in such a position
that the hand cannot come in contact with the horse
while using the comb. The wire braces which run from
the shank over the back to the front teeth give strength
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and at the same time serve as an extra handle; and
when clasped by the fingers in connection with the raised
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Double Beam R. R. Truck Scale, Com-
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First Power Locomotive Scales. Testing

Machines any capacity.

Sheffield Manufactures in the American Market.

A correspondent of the *Sheffield Independent* writing from New York, sends that journal a gloomy account of the prospects of trade with this country. We quote without comment:

When in 1870 and 1871 the purchasing power of the people of the South began to decline, and with masterly wisdom Sheffield manufacturers advanced their prices 25 per cent., the knell of the table knife trade sounded. Since then the competition among Yankee makers has put the Sheffielder nowhere. They can and do sell a better knife at \$9, currency, than a Sheffield man can lay down here at \$10.50 in gold. To all intents and purposes this middle-class table knife trade is lost to Sheffield, it seems, forever; for in spite of there being any one therein employed almost constantly in an embarrassed financial condition, and selling constantly below cost, the Yankee companies have always been able to carry on and keep the Sheffielder out. What they would do if Sheffield prices fell 25 per cent., or the duty was lowered, or the premium on gold was annihilated, or if all three came at once, I will not say, but barring some such *deus ex machina*, I see no deliverer at hand worth counting upon. Thus in, say 10 years, was one large, labor employing business lost to Sheffield. Next to the table knife trade the extinction of the saw trade has been, perhaps, most complete. In this article the American manufacturers actually dictated the duty imposed under the tariff of 1861. It was not "how much will the trade bear?" but what will absolutely exclude Sheffield goods? By the use of *ad valorem* and specific duties this last condition has been practically accomplished, and at Philadelphia and in New England saw factories on a very large scale, and conducted with eminent skill supply the whole country and actually export to neutral markets.

The steel trade trembles in the balance. Cheap steels are just as much the staple products of steel makers here as in Sheffield, and in truth Sheffield cannot compete with the native makers in them, probably not even if a revenue tariff was imposed. Practical men regard the trade in cheap steel as lost to Sheffield; and that in best cast steel will follow, if the existing state of things last long enough to breed up a sufficient number of practical workmen in the trade. At any rate, any dependence on Sheffield for steel of any kind is over and gone.

The file trade is another instance of the use made of machinery in producing an article usually made by hand. By adopting machinery, the production of cheap files in Sheffield for this market has been brought to an end. The machine cut, machine forged, machine ground files of this country render the exportation of any but the best files from Sheffield useless. Even they are kept down in price by the best makers here, who sell a file in currency against the Sheffield file in gold which gives certain satisfaction. The quantity of files made in this country is enormous. It is a moot point whether it is possible to sell the best Sheffield files here at all and make a profit.

Perhaps the cutlery or pocket knife trade is, and will remain, the last that will be swallowed, and it all depends how soon tariff relief comes how long even this trade has to live.

A gentleman of Boston is the owner of a miniature steam yacht, 17 feet long and 42 inch beam, with a hull weighing but 100 pounds. She is propelled by a steel boiler weighing only 48 pounds, with a cylinder of 1 1/4 inch, and a stroke of 2 3/4 inches. The propeller is four-bladed, and is placed under the boat 2 feet from the stern. One gallon of water fills the boiler, and as it condenses it is only necessary to supply the waste. The boat draws 24 inches of water, which carries her propeller clear. She cost about \$500, and is rated half horse-power. Her owner recently made a voyage with her from Boston to Portland, Me.

The Pittsburgh Bolt Company, which was compelled to make an assignment on account of the suspension of the firm of Gerry, Tilton & Caldwell, iron brokers, of this city, will continue operations until the stock is worked up and all orders are filled. The stockholders hope that arrangements can be made that will bring their financial difficulties to a satisfactory end.

Blood's Locomotive Works, at Manchester, N. H., will be run for the present only five days in a week. About 150 workmen are employed there now, which is less than one-fourth required to run the works at the full capacity.

Tibbals, Shirk & Whitehead, Erie, Pa., are now employing some 90 people, and making casts of eight tons of stoves per day, on general patterns of cooking and heating, parlor, office and hall stoves.

The people of New Freeport, Greene county, Pa., are agitating the building of a narrow gauge railroad from that place to a point on the Baltimore & Ohio Railroad, six miles in length.

For the week ending on the 4th of July, Lock Haven, Pa., sent 1,061,000 feet of lumber to market. The total amount sent for the season thus far foots up 17,122,000 feet.

The American Tool Company is running its foundry at Hyde Park, Mass., about two-thirds of the time, and with half the usual number of hands.

The New Lexington (O.) *Tribune* says it is very probable that a blast furnace will be located at North Ferrara during the summer.

The tack factory at Assonet, Mass., will resume operations this month, with an increased number of machines.

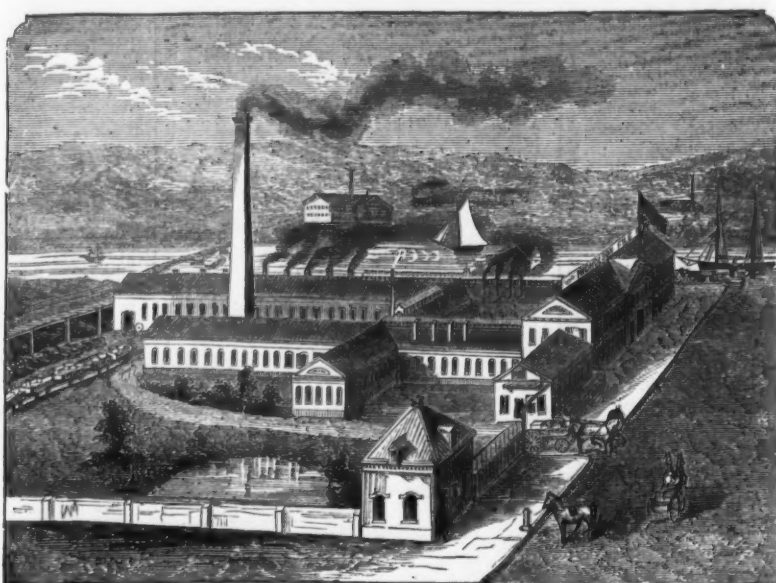


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Containing: Stencil Alphabet, Figures, Can Stencil Ink and Brush. For marking boxes, barrels, bags, and packages for shipment. Printing all manner of show cards, notices, signs, numbers, prices, &c., and other purposes too numerous to mention. Instructive and amusing for boys.

WHOLESALE PRICES.									
Size, $\frac{1}{4}$ in., per dozen	\$6.00	Size, $1\frac{1}{4}$ in., per dozen	\$10.00				
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- Seventh.**—All Files under seven inches are put up in boxes of one dozen each, and neatly labeled.
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- Finally.**—Our Files are warranted to be hard, well cut and sound. They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of our ability to furnish a good article cheap, is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

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Solicitor of Patents. | G. HOWSON
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HENRY DISSTON & SONS, Keystone Saw, Tool, Steel and File Works.

Front and Laurel Streets, Philadelphia.

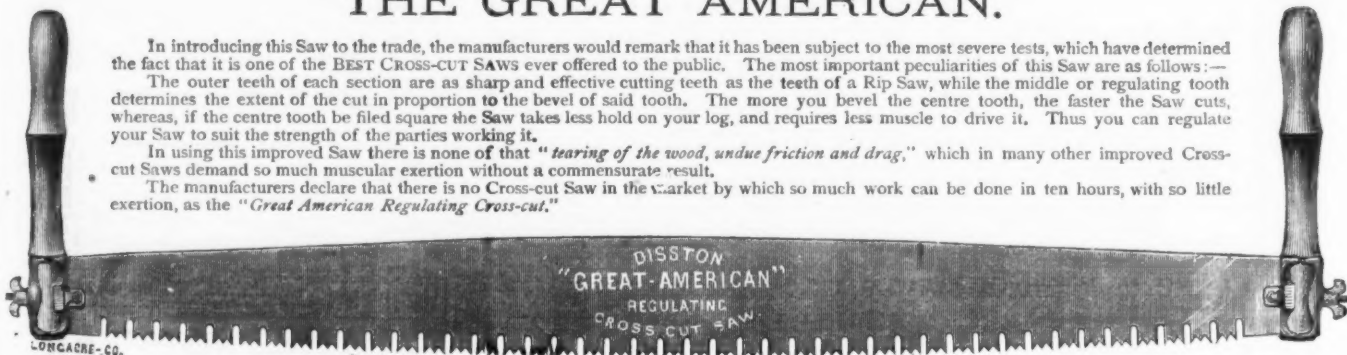
Branch Works, Tacony, Philadelphia.

Branch House, Randolph & Market Streets, Chicago, Ill.

Our Celebrated CROSS-CUT AND WOOD SAWS.

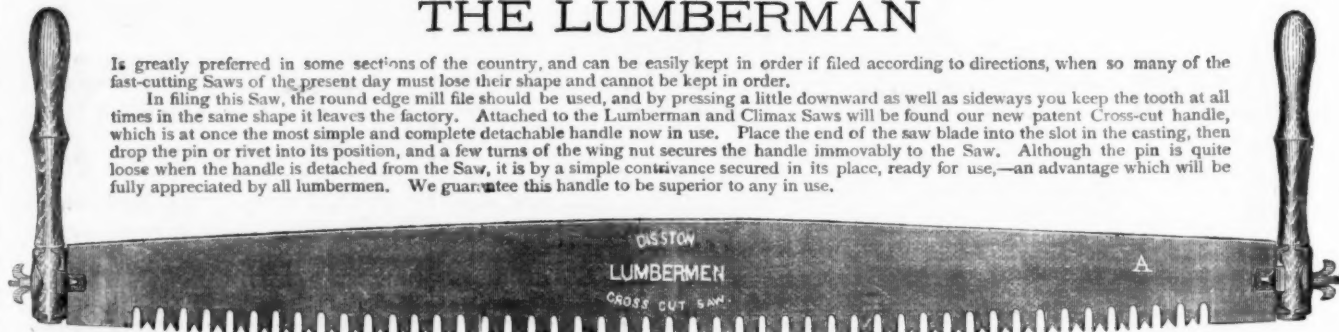
THE GREAT AMERICAN.

In introducing this Saw to the trade, the manufacturers would remark that it has been subject to the most severe tests, which have determined the fact that it is one of the BEST CROSS-CUT SAWS ever offered to the public. The most important peculiarities of this Saw are as follows:—
The outer teeth of each section are as sharp and effective cutting teeth as the teeth of a Rip Saw, while the middle or regulating tooth determines the extent of the cut in proportion to the bevel of said tooth. The more you bevel the centre tooth, the faster the Saw cuts, whereas, if the centre tooth be filed square the Saw takes less hold on your log, and requires less muscle to drive it. Thus you can regulate your Saw to suit the strength of the parties working it.
In using this improved Saw there is none of that "tearing of the wood, undue friction and drag," which in many other improved Cross-cut Saws demand so much muscular exertion without a commensurate result.
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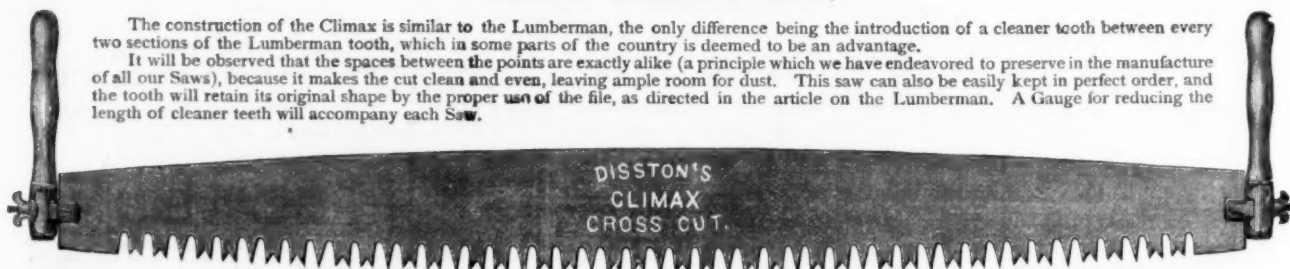
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Is greatly preferred in some sections of the country, and can be easily kept in order if filed according to directions, when so many of the fast-cutting Saws of the present day must lose their shape and cannot be kept in order.
In filing this Saw, the round edge mill file should be used, and by pressing a little downward as well as sideways you keep the tooth at all times in the same shape it leaves the factory. Attached to the Lumberman and Climax Saws will be found our new patent Cross-cut handle, which is at once the most simple and complete detachable handle now in use. Place the end of the saw blade into the slot in the casting, then drop the pin or rivet into its position, and a few turns of the wing nut secures the handle immovably to the Saw. Although the pin is quite loose when the handle is detached from the Saw, it is by a simple contrivance secured in its place, ready for use,—an advantage which will be fully appreciated by all lumbermen. We guarantee this handle to be superior to any in use.



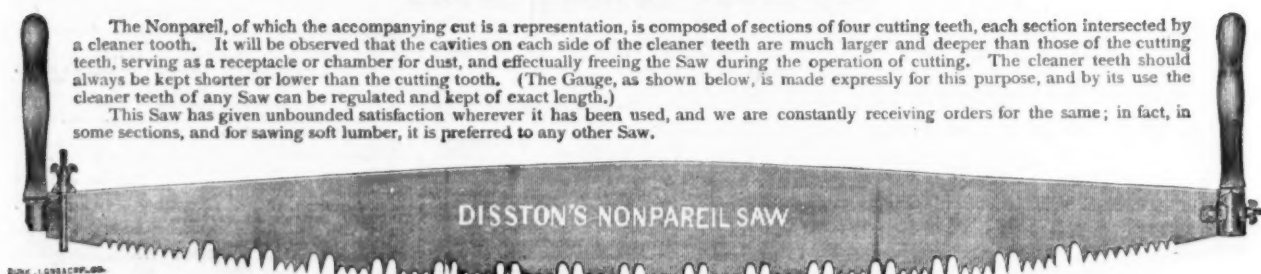
THE CLIMAX.

The construction of the Climax is similar to the Lumberman, the only difference being the introduction of a cleaner tooth between every two sections of the Lumberman tooth, which in some parts of the country is deemed to be an advantage.
It will be observed that the spaces between the points are exactly alike (a principle which we have endeavored to preserve in the manufacture of all our Saws), because it makes the cut clean and even, leaving ample room for dust. This saw can also be easily kept in perfect order, and the tooth will retain its original shape by the proper use of the file, as directed in the article on the Lumberman. A Gauge for reducing the length of cleaner teeth will accompany each Saw.



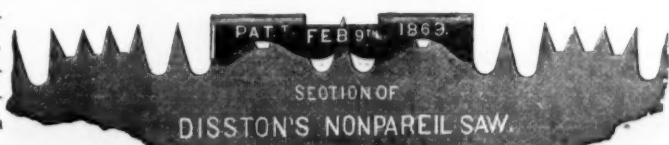
THE NONPAREIL.

The Nonpareil, of which the accompanying cut is a representation, is composed of sections of four cutting teeth, each section intersected by a cleaner tooth. It will be observed that the cavities on each side of the cleaner teeth are much larger and deeper than those of the cutting teeth, serving as a receptacle or chamber for dust, and effectually freeing the Saw during the operation of cutting. The cleaner teeth should always be kept shorter or lower than the cutting tooth. (The Gauge, as shown below, is made expressly for this purpose, and by its use the cleaner teeth of any Saw can be regulated and kept of exact length.)
This Saw has given unbounded satisfaction wherever it has been used, and we are constantly receiving orders for the same; in fact, in some sections, and for sawing soft lumber, it is preferred to any other Saw.

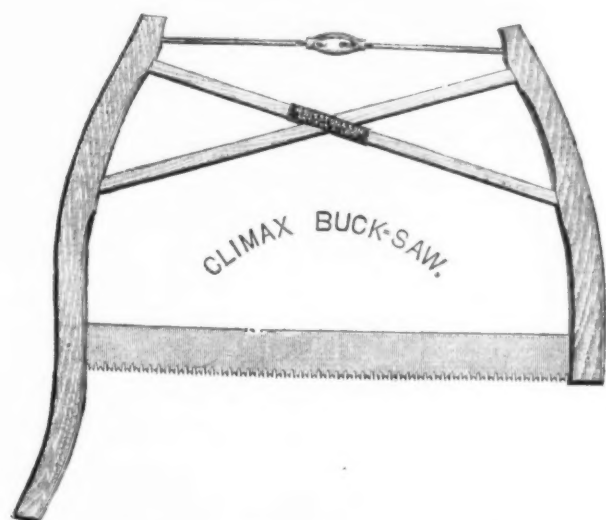


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The Cleaning-Teeth of all Saws should be somewhat shorter than the Cutting-Teeth, and, although shortened, they should be of uniform length throughout. The inner edge of the Gauge rests on the points of the Cutting-Teeth, the Cleaning-Teeth projecting through the opening in center of Gauge. Reduce the projecting points by means of a File, until arrested by the edges of the Gauge, which is made of hardened steel. Thus Tooth after Tooth can be rapidly and correctly reduced to an even length by any unskilled operator.



Showing the Gauge in Position for Filing the Cleaner-Tooth.



CLIMAX BUCK-SAW.



"ARCH FRAME" WOOD SAW.



DISSTON'S WOOD SAW FRAME.

Sheffield Manufactures in the American Market.

A correspondent of the *Sheffield Independent* writing from New York, sends that journal a gloomy account of the prospects of trade with this country. We quote without comment :

When in 1870 and 1871 the purchasing power of the people of the South began to decline, and with masterly wisdom Sheffield manufacturers advanced their prices 25 per cent., the knell of the table knife trade sounded. Since then the competition among Yankee makers has put the Sheffielder nowhere. They can and do sell a better knife at \$9, currency, than a Sheffield man can lay down here at \$10.50 in gold. To all intents and purposes this middle-class table knife trade is lost to Sheffield, it seems, forever; for in spite of there being any one therein employed almost constantly in an embarrassed financial condition, and selling constantly below cost, the Yankee companies have always been able to carry on and keep the Sheffielder out. What they would do if Sheffield prices fell 25 per cent., or the duty was lowered, or the premium on gold was annihilated, or if all three came at once, I will not say, but barring some such *deus ex machina*, I see no deliverer at hand worth counting upon. Thus in, say 10 years, was one large, labor employing business lost to Sheffield. Next to the table knife trade the extinction of the saw trade has been, perhaps, most complete. In this article the American manufacturers actually dictated the duty imposed under the tariff of 1861. It was not "how much will the trade bear?" but what will absolutely exclude Sheffield goods?" By the use of *ad valorem* and specific duties this last condition has been practically accomplished, and at Philadelphia and in New England saw factories on a very large scale, and conducted with eminent skill supply the whole country and actually export to neutral markets.

The steel trade trembles in the balance. Cheap steels are just as much the staple products of steel makers here as in Sheffield, and in truth Sheffield cannot compete with the native makers in them, probably not even if a revenue tariff was imposed. Practical men regard the trade in cheap steel as lost to Sheffield; and that in best cast steel will follow, if the existing state of things last long enough to breed up a sufficient number of practical workmen in the trade. At any rate, any dependence on Sheffield for steel of any kind is over and gone.

The file trade is another instance of the use made of machinery in producing an article usually made by hand. By adopting machinery the production of *cheap* files in Sheffield for this market has been brought to an end. The machine cut, machine forged, machine ground files of this country render the exportation of any but the *best* files from Sheffield useless. Even they are kept down in price by the best makers here, who sell a file in currency against the Sheffield file in gold which gives certain satisfaction. The *quantity* of files made in this country is enormous. It is a moot point whether it is possible to sell the best Sheffield files here at all and make a profit.

Perhaps the cutlery or pocket knife trade is, and will remain, the last that will be swallowed, and it all depends how soon tariff relief comes how long even this trade has to live.

A gentleman of Boston is the owner of a miniature steam yacht, 17 feet long and 42 inches beam, with a hull weighing but 100 pounds. She is propelled by a steel boiler weighing only 48 pounds, with a cylinder of $1\frac{1}{4}$ inches, and a stroke of $2\frac{3}{4}$ inches. The propeller is four-bladed, and is placed under the boat 2 feet from the stern. One gallon of water fills the boiler, and as it condenses it is only necessary to supply the waste. The boat draws 34 inches of water, which carries her propeller clear. She cost about \$500, and is rated half horse-power. Her owner recently made a voyage with her from Boston to Portland, Me.

The Pittsburgh Bolt Company, which was compelled to make an assignment on account of the suspension of the firm of Gerry, Tilton & Caldwell, iron brokers, of this city, will continue operations until the stock is worked up and all orders are filled. The stockholders hope that arrangements can be made that will bring their financial difficulties to a satisfactory end.

Blood's Locomotive Works, at Manchester, N. H., will be run for the present only five days in a week. About 150 workmen are employed there now, which is less than one-fourth required to run the works at the full capacity.

Tibbals, Shirk & Whitehead, Erie, Pa., are now employing some 90 people, and making casts of eight tons of stoves per day, on general patterns of cooking and heating, parlor, office and hall stoves.

The people of New Freeport, Greene county, Pa., are agitating the building of a narrow gauge railroad from that place to a point on the Baltimore & Ohio Railroad, six miles in length.

For the week ending on the 4th of July, Lock Haven, Pa., sent 1,061,000 feet of lumber to market. The total amount sent for the season thus far foots up 17,122,000 feet.

The American Tool Company is running its foundry at Hyde Park, Mass., about two-thirds of the time, and with half the usual number of hands.

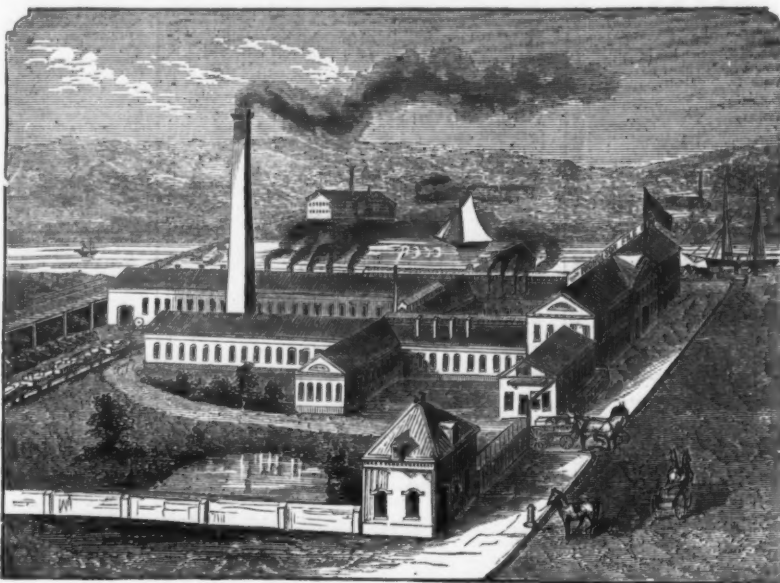
The New Lexington (O.) Tribune says it is very probable that a blast furnace will be located at North Ferrara during the summer.

The tack factory at Assonet, Mass., will resume operations this month, with an increased number of machines.



WHOLESALE PRICES.			
Size,	$\frac{1}{2}$ in.,	per dozen	\$6.00
"	$\frac{3}{4}$ " "	"	6.50
"	1 " "	"	7.00
"	$1\frac{1}{4}$ " "	"	9.00
Size,	$1\frac{1}{2}$ in.,	per dozen	\$10.00
"	2 " "	"	12.00
"	2 $\frac{1}{2}$ " "	"	18.00
"	$1\frac{1}{2}$ " "	with lower case,	15.00

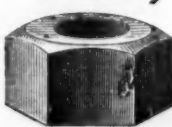
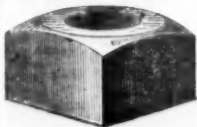
No. 66 Fulton Street, New York.



NICHOLSON FILE COMPANY, Providence, R. I.

SOLD BY HARDWARE DEALERS GENERALLY.

NEW HAVEN NUT CO.,

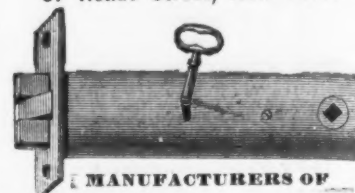


PENNA. WAREHOUSING

SAFE DEPOSIT CO.
WAREHOUSES:
FRONT AND LOMBARD STREETS.

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Schweitzer Mfg. Co.,



JAMES HENSHALL,
Engineer, Machinist & Blacksmith,
1056 Beach St. PHILADELPHIA.
Drawings made to order. Repairing of all kinds promptly attended to. Blacksmithing executed in all its branches.

Designing & Engraving ON WOOD.

Done in the best manner at the office of *The Iron Age*
and *The Metal Worker*,
10 Warren Street, New York.
Estimates given for Catalogues, Posters, &c.
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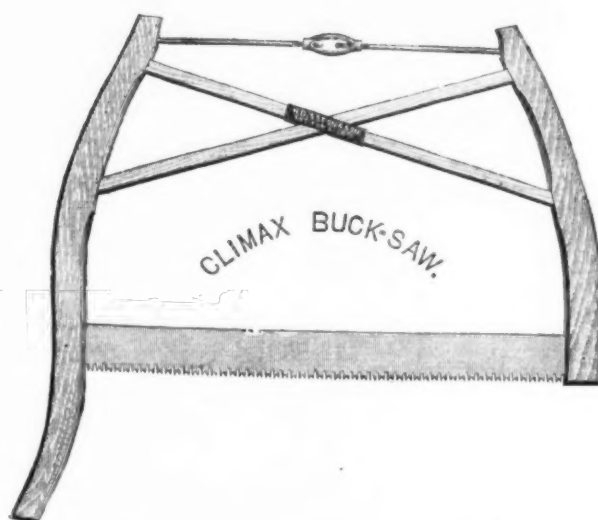
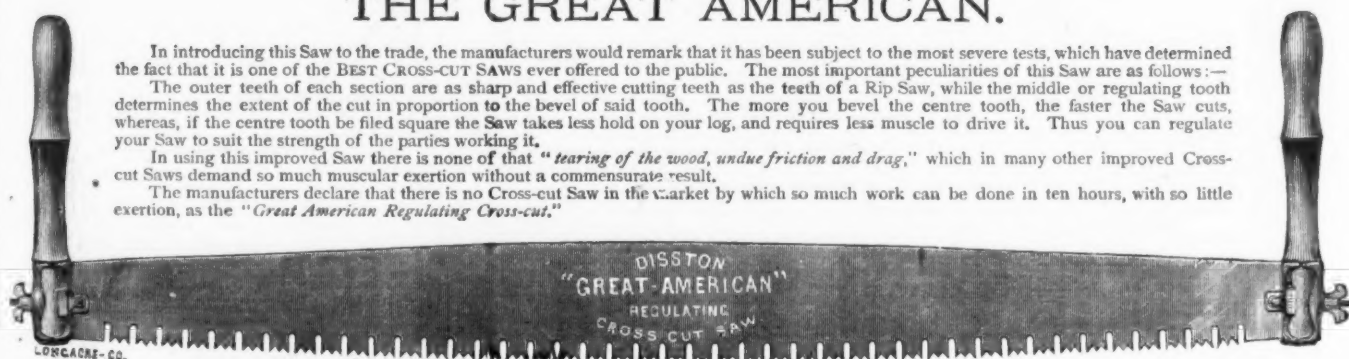
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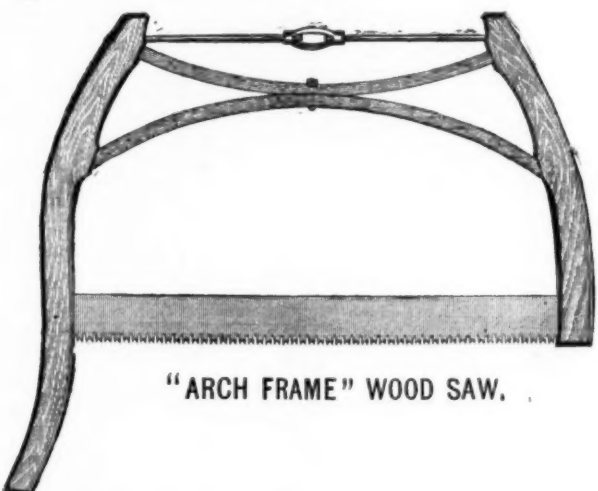
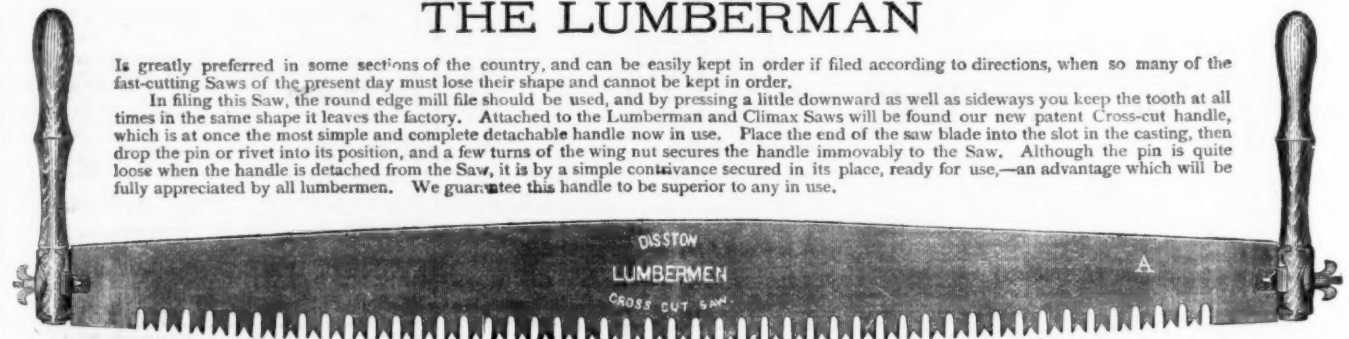
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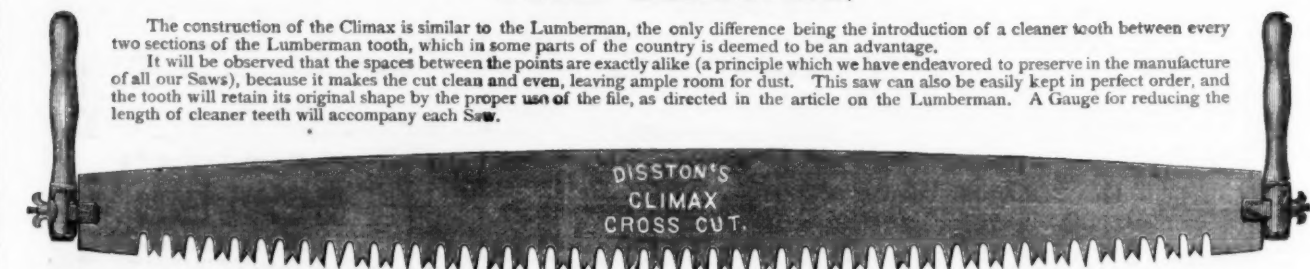
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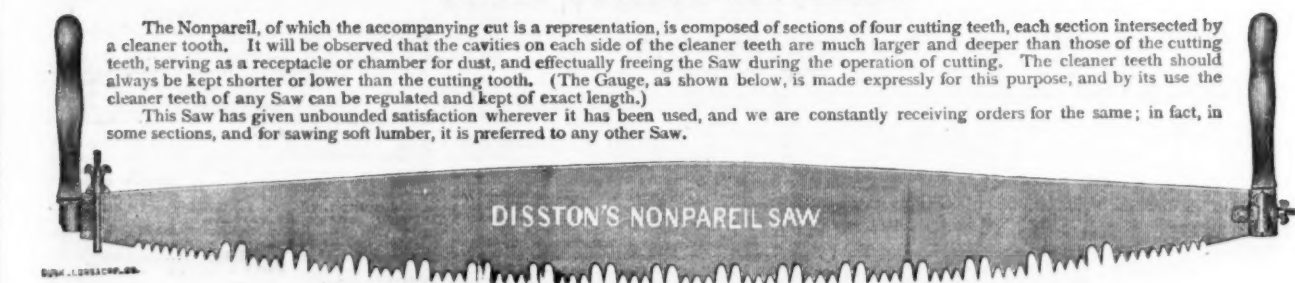
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Showing the Gauge in Position for Filing the Cleaner-Tooth.

New York Wholesale Prices, July 21, 1875.

HARDWARE.

ANVILS.		Wrought Iron.		Barbed Wire.		Horse Nails.		Imitation Emerson.	
Solid Cast Steel.	per 100 lbs. \$14	Fast Joint, Narrow, 14 and Regular.	dis 30	Harford File Co.	\$5 50 to 6 currency—dis 10	American Pressed, Nos.	5 6 7 8 9 10	Hunt's.	dis 27 1/2—dis 40
Wright's.	per 100 lbs. \$14	Loose Joint, Narrow and Broad.	dis 30	Wheeler & Co.	\$5 00 to 6 currency	Available.	100 200 300 400 500 600	Chapman.	dis 10 15
Armstrong's.	per 100 lbs. \$14	Table Butts, Back Flange, &c.	dis 30	Wheeler, Clemons & Co.	\$5 00 to 6 currency	Brands.	100 200 300 400 500 600	Torrey's.	dis 10 15
Adams'.	per 100 lbs. \$14	Draw Butt, Regular.	dis 30	Rothery's.	\$5 00 to 6 currency	Buffalo Forged.	100 200 300 400 500 600	Saunders.	dis 10 15
Apple & Co.	per 100 lbs. \$14	Loose Pin, Wrt.	dis 30	J. & Riley Carr.	\$5 00 to 6 currency	National, Pointed and	100 200 300 400 500 600		
Domestic.	per 100 lbs. \$14	Am. Spiral Spring Butt Co.	dis 30	Stube's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Turn Table.	per 100 lbs. \$14	Blind Butts.	dis 30	Butcher's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Lightning.	per 100 lbs. \$14	Patent.	dis 30	Water Spencer & Co.'s "Diamond"	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Headings.	per 100 lbs. \$14	Lull & Porter.	dis 30	Speck & Jackson's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Union.	per 100 lbs. \$14	Shepard.	dis 30	Newbold's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Skeleton Paring, Cutting and Slicing.	\$5 00 per doz net	Nicholson.	dis 30	Turton Bros. & Matthews.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Bay State Paring, Cutting and Slicing.	\$5 00 per doz net	Huffer.	dis 30	Shinworth's (Van Wart & McCoy).	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
Chinax slicer.	\$5 00 per doz net	Clark's, Nos. 1, 2 and 3.	dis 30	Fisher's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 4.	dis 30	Goodrich's.	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 5.	dis 30	Thos. Turner & Co. (Peter A. Frase & Co.).	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 6.	dis 30	"Phil's Sheffield."	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 7.	dis 30	Limet & Co. (French).	\$5 00 to 6 currency	Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 8.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 9.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
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		Clark's No. 57.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 58.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 59.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 60.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 61.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 62.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 63.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 64.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 65.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 66.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 67.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 68.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 69.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 70.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 71.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 72.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 73.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 74.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 75.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 76.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 77.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 78.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 79.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 80.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 81.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 82.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 83.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 84.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 85.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 86.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 87.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 88.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 89.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 90.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 91.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 92.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 93.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 94.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 95.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 96.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 97.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 98.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 99.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		
		Clark's No. 100.	dis 30			Polished, Fat. Fin.	100 200 300 400 500 600		

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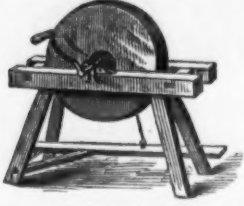


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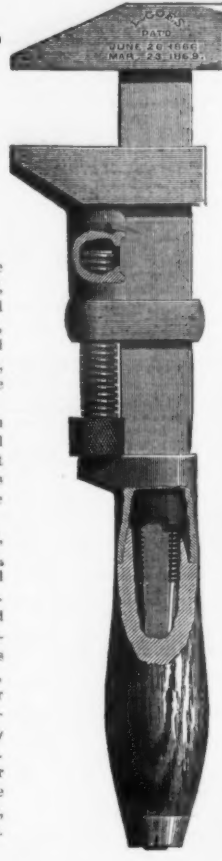
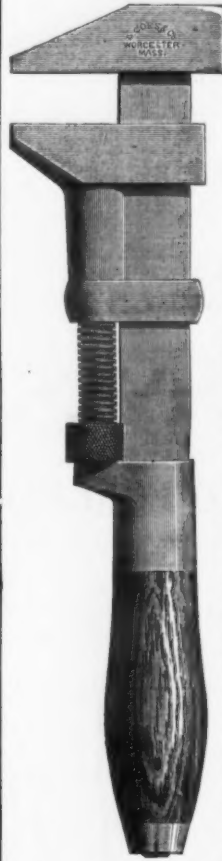
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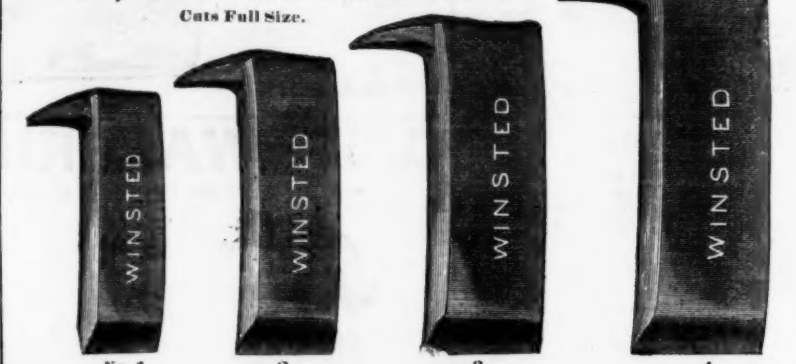
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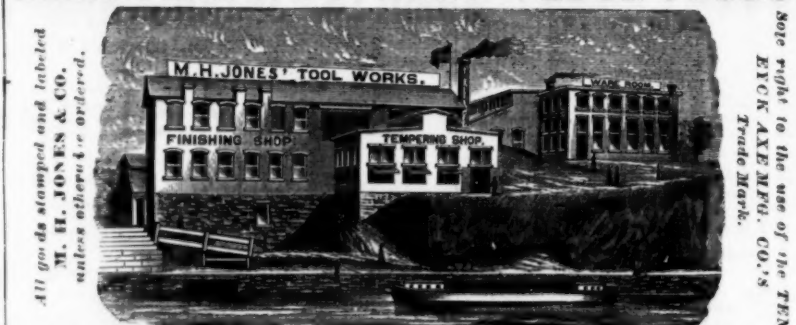
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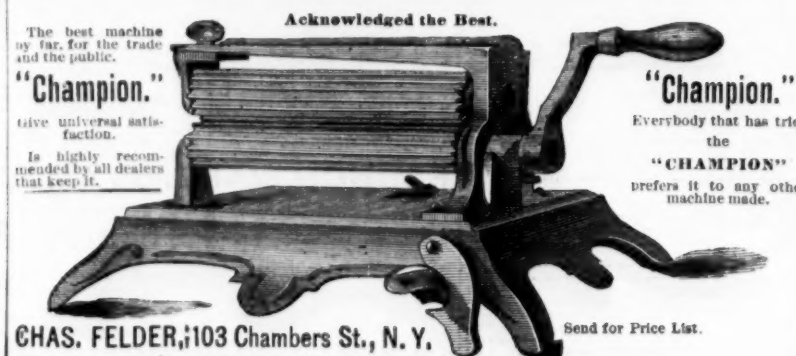
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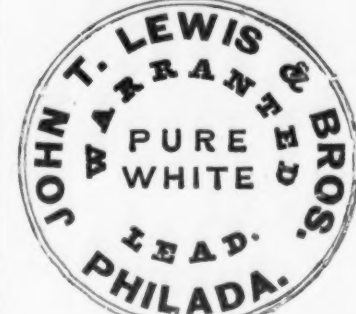
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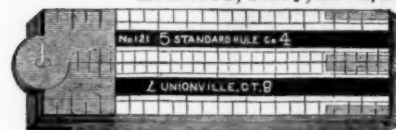
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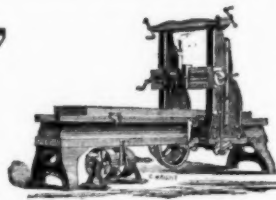
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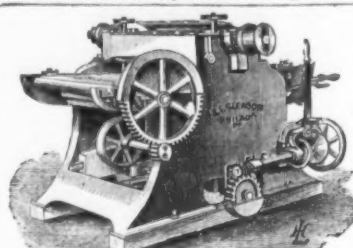
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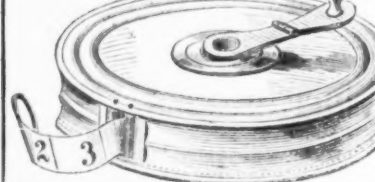
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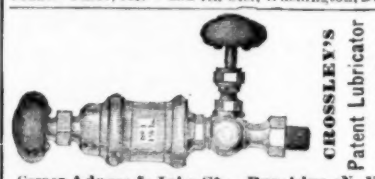
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Patent Lubricator
GLOBE VALVES, &c.**

Corner Adams & John Sts., Brooklyn, N. Y.

**Bennett Hotchkiss and
N. C. Stiles' Patent.**

This Drop (which has been illustrated in this journal) is of that class in which the Hammer is raised by a stiff belt or board passing up between two friction rolls, and is so well known that we will only describe our improvements. The patent is in our working under the name of BENNETT HOTCHKISS (who in an interference case with Goulding and Cheney was declared the first inventor) and N. C. STILES. Our improvements consist: First—Of an arrangement of parts that makes it the most complete Jobbing Hammer, and will take the place of a great extent of all other kinds of forcing. In addition to the upright rod, which is operated by the hammer to open and close the rolls, we place another rod the lower end of which is secured to the end of a lever which is operated by the hand or foot, which operation also opens and closes the rolls at will. The lower end of this rod has a slot, so that the action of the hammer will not disturb the hand lever, thereby preventing the hand being injured, as otherwise would be the case.

Second—No dog is used on the upright to hold up the hammer. The belt or board passes up between two changeable rolls under the rolls, so arranged that as the hammer is raised they will freely open of themselves, but close as they will close, and hold up the hammer.

To let the hammer fall the clamps are opened by pressure upon the foot treadle. Third—The board or belt is secured to the hammer by an elastic connection, which prevents the sudden jar and construction of the same. The back roll is made adjustable to different thicknesses of board or belt, as also are the clamps. An adjustable collar on the upright rod allows the operator to obtain any height of blow desired automatically. If one blow is wanted, press upon the treadle and remove the pressure as soon as the blow is given. Keep the foot upon the treadle and the blow will be repeated until the pressure is removed. If a blow off less height than the collar is set for is required, work the hand lever, which will give you any height of blow desired. The hammer can be held up at any point below the collar by bringing the hand lever into action when the hammer is at the desired height, so that the next blow can be given from a state of rest, or less height than the collar is set for. This is a feature no other drop has; that is, the first blow struck can be of less height than the second or third, and obtained from a state of rest. A gentle pressure upon the treadle will allow the hammer to go down slowly, but it will stop and remain suspended at any point as soon as the pressure is removed. The clamps in holding up the hammer keep the board from touching either roll and prevents the same from being worn uneven.

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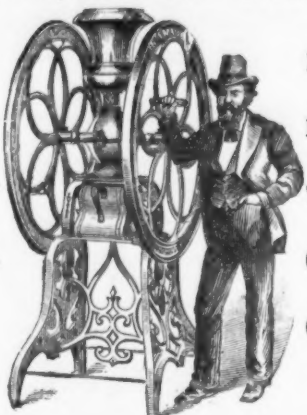
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Measuring
Faucets,
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Borers,
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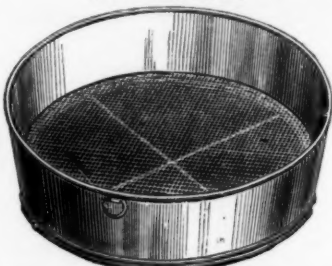
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The best sieve in use. To be had of all dealers.
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For Bevel and Square Work and Re-sawing.
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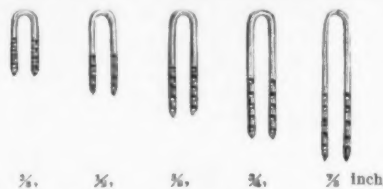
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Rough & Ready

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CLIPPER SCYTHES,

Warranted.

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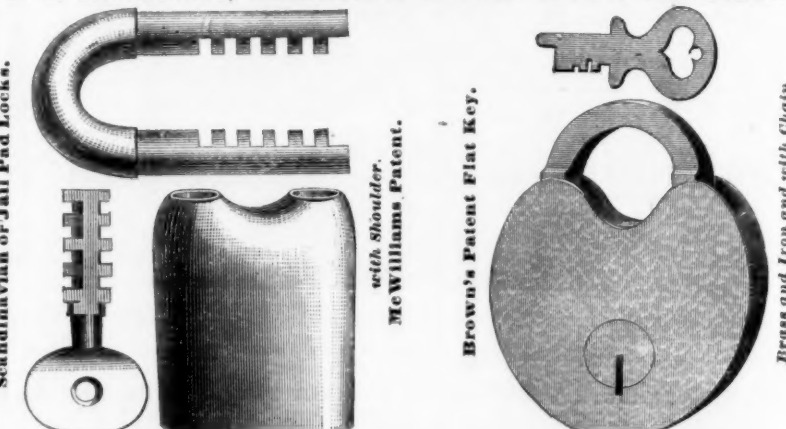
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AXES.

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 Wilkinson's..... 110
 Eagle..... 110
 Hat 11 cents—dis 30 @ 20 1/2

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 Spotted..... 7 50
 Victor..... 7 50
 Domestic..... 7 50
 Reading..... 7 50
 Bay State Paring, Coring and Slicing..... 12 00
 Peach Parers..... 10 50
 Axes.—Mann's Light..... Per doz \$12 00
 Hunt's Light..... 14 00 @ 12 50
 Red Indian, all sizes..... 12 00 @ 11 50
 Red Chertain, all sizes..... 12 00 @ 11 50
 Crown France..... 12 00 @ 12 00

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 Douglas & Ives Bits..... \$10 50
 Connecticut Valley Auger Bits..... \$10 50
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 Jennings' Bits..... \$10 50
 Bates' Nut Augers..... \$10 50
 Douglas & Ives Augers..... \$10 50
 Watrous' Ship Augers..... \$10 50
 Honney's Pat. Hollow Augers..... \$10 50
 Stearns' Patent Hollow Augers..... \$10 50

Augers.—Lenders, Fray & Clark's..... sold on Morton's new
 Chatterton's..... \$10 50
 Common Spring with Hook..... \$10 50 @ 2 00

Bells.—Devlin Bros. Mfg. Co. Light Hand..... \$10 50
 Common (Tissue Paper Weight)..... \$10 50
 Swiss Pattern Hand Bells..... \$10 50
 Connel's Door Bells..... \$10 50
 Gt. Western & Kentucky Cow..... \$10 50 @ 10 50

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 Augur..... \$10 50

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 Philadelphia..... \$10 50
 Eagle, (Coleman)..... \$10 50
 Wrought Nut, Stanley..... \$10 50 @ 10 50
 Braces.—Barber's..... \$10 50
 Ruckus..... \$10 50
 Bartholomew's American Ball..... \$10 50 @ 10 50
 Southard..... \$10 50

Bolts.—Cast Fast Joint, Narrow..... \$10 50 @ 10 50
 Broad..... \$10 50 @ 10 50
 Cast Fast Loose Joint..... \$10 50 @ 10 50
 Acorn, Loose Pin..... \$10 50 @ 10 50
 Moyses & Parmenter..... \$10 50 @ 10 50
 Acorn Jap..... \$10 50 @ 10 50
 Wrought Loose Pin..... \$10 50 @ 10 50
 Table Hinges and Back Flaps..... \$10 50 @ 10 50
 Loose Joint..... \$10 50 @ 10 50

Bolts.—Parker's Blind Bolts..... \$10 50
 Garrett's..... \$10 50
 Lull & Porter's..... \$10 50
 Garrett's Blind Bolts Light No. 0..... \$10 50
 Lull & Porter Pattern..... \$10 50
 Chertone Blind Bolts..... \$10 50
 Chains.—German Hammer..... \$10 50
 Collar..... \$10 50
 Galvanized Pump..... \$10 50
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 Chain, 3/4 per lb. less.

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 Tang..... \$10 50 @ 10 50
 Beater's Framing..... \$10 50 @ 10 50
 Beater's Iron Bed..... \$10 50 @ 10 50
 Porcelain Wheel Bed..... \$10 50 @ 10 50
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 Porcelain Wheel..... \$10 50 @ 10 50

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 Discount on 2 dozen lots, \$2 per dozen

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 Patent Box and Side..... \$10 50
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 Adjustable Handle..... \$10 50 @ 10 50
 Beatty..... \$10 50 @ 10 50

Fry Pans.—Timmed..... \$10 50 @ 45
 \$10 50 @ 40 100 200 300 400 500 600 700 800 900
 \$10 50 @ 40 100 200 300 400 500 600 700 800 900
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 \$10 50 @ 40 100 200 300 400 500 600 700 800 900

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 Taper..... \$10 50
 Butcher's Mill (Advanced March 5th)..... \$10 50 @ 10 50
 Bastard..... \$10 50 @ 10 50
 Taper..... \$10 50 @ 10 50

Files.—K. F. M.—4 1/2 in. rolls..... \$10 50 @ 10 50
 6 in. rolls..... \$10 50 @ 10 50
 Mrs. Knox—4 in. rolls..... \$10 50 @ 10 50
 6 in. rolls..... \$10 50 @ 10 50

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 Hammer & Sledge..... \$10 50 @ 10 50
 Verco..... \$10 50 @ 10 50

Hammers.—Beatty's..... \$10 50 @ 10 50
 Shingling and Halt..... \$10 50 @ 10 50
 Yerkes & Plumb..... \$10 50 @ 10 50
 Shingling and Halt..... \$10 50 @ 10 50

Hammers.—Shingling and Halt..... \$10 50 @ 10 50
 Claw..... \$10 50 @ 10 50

Hinges.—Stran and T., (Changed March 21)..... \$10 50 @ 10 50
 Horse Nails..... \$10 50 @ 10 50
 Ausable..... \$10 50 @ 10 50
 Globe..... \$10 50 @ 10 50
 Brundage..... \$10 50 @ 10 50

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 American Padlock..... \$10 50 @ 10 50
 Scandinavian Pad Locks..... \$10 50 @ 10 50

Locks and Latches.—No..... \$10 50 @ 10 50
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Scissors.—Iron..... new list, April 1st, 1875, dis 6 1/2
 Spoons..... \$10 50 @ 10 50
 Plates..... \$10 50 @ 10 50
 Britannia Boardman's (new list)..... \$10 50 @ 10 50
 Parkers (old list)..... \$10 50 @ 10 50
 German Silver..... \$10 50 @ 10 50
 Lancers & Granger Iron..... \$10 50 @ 10 50
 Springs.—Gray's Door..... \$10 50 @ 10 50
 Corry's Door..... \$10 50 @ 10 50
 Stocks and Dies..... \$10 50 @ 10 50
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 Wells Thrall, No. 2..... \$10 50 @ 10 50
 Histon's No. 2..... \$10 50 @ 10 50
 Tacks, &c.—Half Weight Tacks..... \$10 50 @ 10 50
 by the case, dis 2 1/2
 Clout and Finishing Nails..... \$10 50 @ 10 50
 Traps.—Genuine Oneida—Newhouse list..... \$10 50 @ 10 50
 Imitation..... \$10 50 @ 10 50
 Wrenches.—Cox's Genuine..... \$10 50 @ 10 50
 Cox's Imitation Wrought Bar..... \$10 50 @ 10 50
 Malleable Bar..... \$10 50 @ 10 50
 Kellogg's Malleable Bar..... \$10 50 @ 10 50
 Taft's Pattern (Wrought Bar)..... \$10 50 @ 10 50
 Philadelphia Tool Co.'s Pat. Duplex..... \$10 50 @ 10 50
 Improved Ratchet..... \$10 50 @ 10 50
 Adjustable Force..... \$10 50 @ 10 50
 Wire.—No. 0 to 18..... (Advanced April 24th)..... \$10 50 @ 10 50
 No. 19 to 26..... \$10 50 @ 10 50
 No. 27 to 36..... \$10 50 @ 10 50
 Coppered to 12..... \$10 50 @ 10 50
 Tinned Broom Wire..... \$10 50 @ 10 50
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July 15, 1875.

Augers.—Snell Mfg. Co..... \$10 50 @ 10 50
 Phenix..... \$10 50 @ 10 50
 Bells, Cow—Law's Genuine..... \$10 50 @ 10 50
 Braces.—Spofford's Patent..... \$10 50 @ 10 50
 Brads, Cut..... \$10 50 @ 10 50
 Boards.—Stove, Brooks' Patent..... \$10 50 @ 10 50
 Boring Machines..... \$10 50 @ 10 50
 Wrought Narrow..... \$10 50 @ 10 50
 Broad, Loose Joint..... \$10 50 @ 10 50
 Wrought Butts, Loose Pin..... \$10 50 @ 10 50
 Belting—Rubber..... \$10 50 @ 10 50
 Leather, new list, one tanned..... \$10 50 @ 10 50
 Brick—Bath (box of 2 doz) Best English..... \$10 50 @ 10 50
 Rutheford..... \$10 50 @ 10 50
 Can Openers—Spring..... \$10 50 @ 10 50
 Cases—Parlor Coal Rod..... \$10 50 @ 10 50
 Chalk—White, Carpenter's..... \$10 50 @ 10 50
 Red, Carpenter's..... \$10 50 @ 10 50
 Chisels.—Finner Socket..... \$10 50 @ 10 50
 Framing Socket..... \$10 50 @ 10 50
 Corner Socket Chisel..... \$10 50 @ 10 50
 Silek's Carpenters..... \$10 50 @ 10 50
 Castings—Malleable..... \$10 50 @ 10 50
 Centripetal..... \$10 50 @ 10 50
 Elbows—Corrugated..... \$10 50 @ 10 50
 Charcoal..... \$10 50 @ 10 50
 Russia..... \$10 50 @ 10 50
 Flutes—Malachite Brod..... \$10 50 @ 10 50
 Freezers—Ice Cream—Champion..... \$10 50 @ 10 50
 Hammer—Henry W. Kip's..... \$10 50 @ 10 50
 Hinges, Gate—Shepard's..... \$10 50 @ 10 50
 Hinges—Window Blind..... \$10 50 @ 10 50
 Shepard's and Standard..... \$10 50 @ 10 50
 Wrought Stran and T..... \$10 50 @ 10 50
 Hods, Coal—Plain, Black and Galvanized..... \$10 50 @ 10 50
 Funnel, Black and Galvanized..... \$10 50 @ 10 50
 Fancy and Helmet..... \$10 50 @ 10 50
 Sled Irons..... \$10 50 @ 10 50
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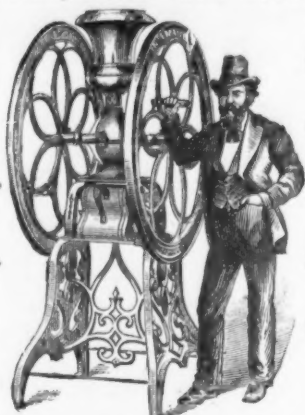
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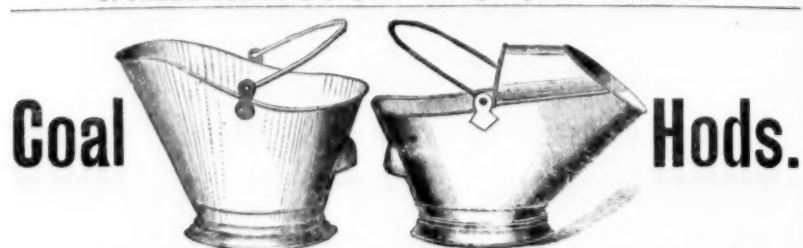
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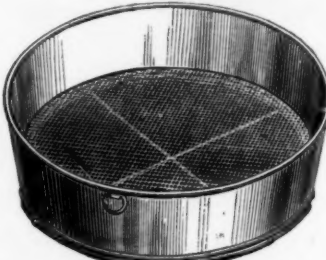
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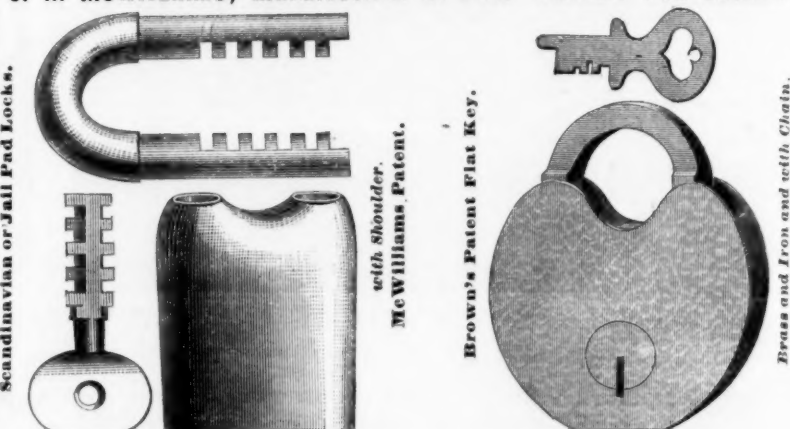
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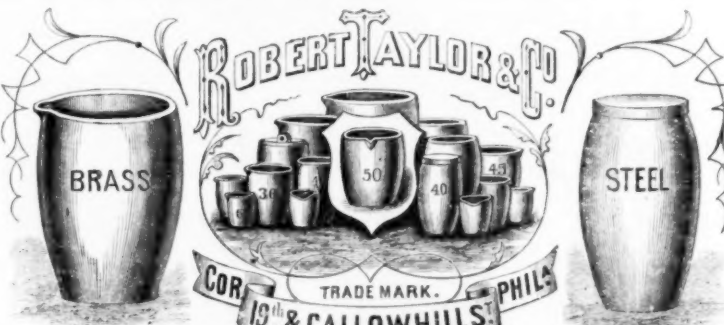
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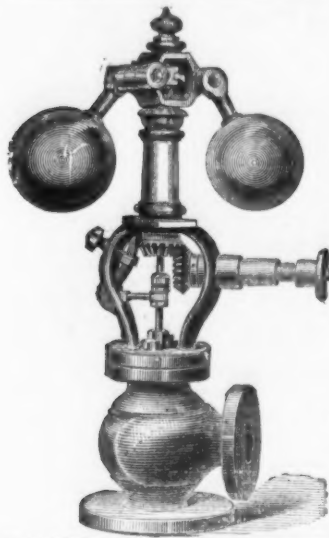
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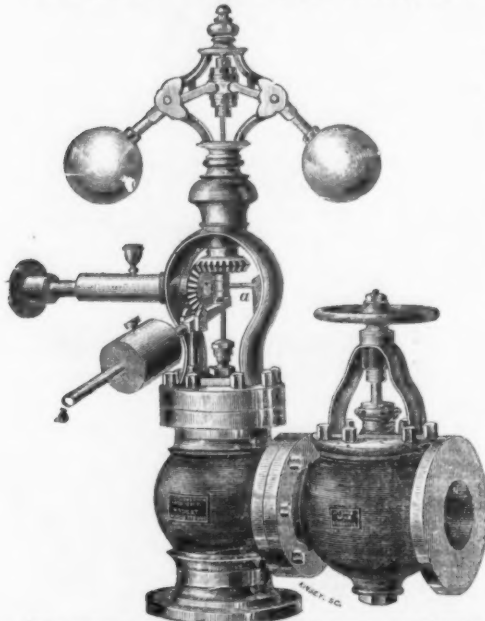
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Capacity of Valve of Diameter of Steam Pipe in Inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
1/2	18.00	20.00	17.00
3/4	20.00	22.00	19.00
1	21.00	23.00	20.00	2.50	5.25
1 1/4	22.00	24.00	21.00	3.00	6.00
1 1/2	23.00	25.00	22.00	3.50	6.75
1 3/4	24.00	26.00	23.00	4.00	7.50
2	25.00	27.00	24.00	4.50	8.25
2 1/4	26.00	28.00	25.00	5.00	9.00
2 1/2	27.00	29.00	26.00	5.50	9.75
2 3/4	28.00	30.00	27.00	6.00	10.50
3	29.00	31.00	28.00	6.50	11.25
3 1/4	30.00	32.00	29.00	7.00	12.00
3 1/2	31.00	33.00	30.00	7.50	12.75
3 3/4	32.00	34.00	31.00	8.00	13.50
4	33.00	35.00	32.00	8.50	14.25
4 1/4	34.00	36.00	33.00	9.00	15.00
4 1/2	35.00	37.00	34.00	9.50	15.75
4 3/4	36.00	38.00	35.00	10.00	16.50
5	37.00	39.00	36.00	10.50	17.25
5 1/4	38.00	40.00	37.00	11.00	18.00
5 1/2	39.00	41.00	38.00	11.50	18.75
5 3/4	40.00	42.00	39.00	12.00	19.50
6	41.00	43.00	40.00	12.50	20.25
6 1/4	42.00	44.00	41.00	13.00	21.00
6 1/2	43.00	45.00	42.00	13.50	21.75
6 3/4	44.00	46.00	43.00	14.00	22.50
7	45.00	47.00	44.00	14.50	23.25
7 1/4	46.00	48.00	45.00	15.00	24.00
7 1/2	47.00	49.00	46.00	15.50	24.75
7 3/4	48.00	50.00	47.00	16.00	25.50
8	49.00	51.00	48.00	16.50	26.25
8 1/4	50.00	52.00	49.00	17.00	27.00
8 1/2	51.00	53.00	50.00	17.50	27.75
8 3/4	52.00	54.00	51.00	18.00	28.50
9	53.00	55.00	52.00	18.50	29.25
9 1/4	54.00	56.00	53.00	19.00	30.00
9 1/2	55.00	57.00	54.00	19.50	30.75
9 3/4	56.00	58.00	55.00	20.00	31.50
10	57.00	59.00	56.00	20.50	32.25
10 1/4	58.00	60.00	57.00	21.00	33.00
10 1/2	59.00	61.00	58.00	21.50	33.75
10 3/4	60.00	62.00	59.00	22.00	34.50
11	61.00	63.00	60.00	22.50	35.25
11 1/4	62.00	64.00	61.00	23.00	36.00
11 1/2	63.00	65.00	62.00	23.50	36.75
11 3/4	64.00	66.00	63.00	24.00	37.50
12	65.00	67.00	64.00	24.50	38.25
12 1/4	66.00	68.00	65.00	25.00	39.00
12 1/2	67.00	69.00	66.00	25.50	39.75
12 3/4	68.00	70.00	67.00	26.00	40.50
13	69.00	71.00	68.00	26.50	41.25
13 1/4	70.00	72.00	69.00	27.00	42.00
13 1/2	71.00	73.00	70.00	27.50	42.75
13 3/4	72.00	74.00	71.00	28.00	43.50
14	73.00	75.00	72.00	28.50	44.25
14 1/4	74.00	76.00	73.00	29.00	45.00
14 1/2	75.00	77.00	74.00	29.50	45.75
14 3/4	76.00	78.00	75.00	30.00	46.50
15	77.00	79.00	76.00	30.50	47.25
15 1/4	78.00	80.00	77.00	31.00	48.00
15 1/2	79.00	81.00	78.00	31.50	48.75
15 3/4	80.00	82.00	79.00	32.00	49.50
16	81.00	83.00	80.00	32.50	50.25
16 1/4	82.00	84.00	81.00	33.00	51.00
16 1/2	83.00	85.00	82.00	33.50	51.75
16 3/4	84.00	86.00	83.00	34.00	52.50
17	85.00	87.00	84.00	34.50	53.25
17 1/4	86.00	88.00	85.00	35.00	54.00
17 1/2	87.00	89.00	86.00	35.50	54.75
17 3/4	88.00	90.00	87.00	36.00	55.50
18	89.00	91.00	88.00	36.50	56.25
18 1/4	90.00	92.00	89.00	37.00	57.00
18 1/2	91.00	93.00	90.00	37.50	57.75
18 3/4	92.00	94.00	91.00	38.00	58.50
19	93.00	95.00	92.00	38.50	59.25
19 1/4	94.00	96.00	93.00	39.00	60.00
19 1/2	95.00	97.00	94.00	39.50	60.75
19 3/4	96.00	98.00	95.00	40.00	61.50
20	97.00	99.00	96.00	40.50	62.25
20 1/4	98.00	100.00	97.00	41.00	63.00
20 1/2	99.00	101.00	98.00	41.50	63.75
20 3/4	100.00	102.00	99.00	42.00	64.50
21	101.00	103.00	100.00	42.50	65.25
21 1/4	102.00	104.00	101.00	43.00	66.00
21 1/2	103.00	105.00	102.00	43.50	66.75
21 3/4	104.00	106.00	103.00	44.00	67.50
22	105.00	107.00	104.00	44.50	68.25
22 1/4	106.00	108.00	105.00	45.00	69.00
22 1/2	107.00	109.00	106.00	45.50	69.75
22 3/4	108.00	110.00	107.00	46.00	70.50
23	109.00	111.00	108.00	46.50	71.25
23 1/4	110.00	112.00	109.00	47.00	72.00
23 1/2	111.00	113.00	110.00	47.50	72.75
23 3/4	112.00	114.00	111.00	48.00	73.50
24	113.00	115.00	112.00	48.50	74.25
24 1/4	114.00	116.00	113.00	49.00	75.00
24 1/2	115.00	117.00	114.00	49.50	75.75
24 3/4	116.00	118.00	115.00	50.00	76.50
25	117.00	119.00	116.00	50.50	77.25
25 1/4	118.00	120.00	117.00	51.00	78.00
25 1/2	119.00	121.00	118.00	51.50	78.75
25 3/4	120.00	122.00	119.00	52.00	79.50
26	121.00	123.00	120.00	52.50	80.25
26 1/4	122.00	124.00	121.00	53.00	81.00
26 1/2	123.00	125.00	122.00	53.50	81.75
26 3/4	124.00	126.00	123.00	54.00	82.50
27	125.00	127.00	124.00	54.50	83.25
27 1/4	126.00	128.00	125.00	55.00	84.00
27 1/2	127.00	129.00	126.00	55.50	84.75
27 3/4	128.00	130.00	127.00	56.00	85.50
28	129.00	131.00	128.00	56.50	86.25
28 1/4	130.00	132.00	129.00	57.00	87.00
28 1/2	131.00	133.00	130.00	57.50	87.75
28 3/4	132.00	134.00	131.00	58.00	88.50
29	133.00	135.00	132.00	58.50	89.25
29 1/4	134.00	136.00	133.00	59.00	90.00
29 1/2	135.00	137.00	134.00	59.50	90.75
29 3/4	136.00	138.00	135.00	60.00	91.50
30	137.00	139.00	136.00	60.50	92.25
30 1/4	138.00	140.00	137.00	61.00	93.00
30 1/2	139.00	141.00	138.00	61.50	93.75
30 3/4	140.00	142.00	139.00	62.00	94.50
31	141.00	143.00	140.00	62.50	95.25
31 1/4	142.00	144.00	141.00	63.00	96.00
31 1/2	143.00	145.00	142.00	63.50	96.75
31 3/4	144.00	146.00	143.00	64.00	97.50
32	145.00	147.00	144.00	64.50	98.25
32 1/4	146.00	148.00	145.00	65.00	99.00
32 1/2	147.00	149.00	146.00	65.50	99.75
32 3/4	148.00	150.00	147.00	66.00	100.50
33	149.00	151.00	148.00	66.50	101.25
33 1/4	150.00	152.00	149.00	67.00	102.00
33 1/2	151.00	153.00	150.00	67.50	102.75
33 3/4	152.00	154.00	151.00	68.00	103.50
34	153.00	155.00	152.00	68.50	104.25
34 1/4	154.00	156.00	153.00	69.00	105.00
34 1/2	155.00	157.00	154.00	69.50	105.75
34 3/4	156.00	158.00	155.00	70.00	106.50
35	157.00	159.00	156.00	70.50	107.25
35 1/4	158.00	160.00	157.00	71.00	108.00
35 1/2	159.00	161.00	158.00	71.50	108.75
35 3/4	160.00	162.00	159.00	72.00	109.50
36	161.00	163.00	160.00	72.50	110.25
36 1/4	162.00	164.00	161.00	73.00	111.00
36 1/2	163.00	165.00	162.00	73.50	111.75
36 3/4	164.00	166.00	163.00	74.00	112.50
37	165.00	167.00	164.00	74.50	113.25
37 1/4	166.00	168.00	165.00	75.00	114.00
37 1/2	167.00	169.00	166.00	75.50	114.75
37 3/4	168.00	170.00	167.00	76.00	115.50
38	169.00	171.00	168.00	76.50	116.25
38 1/4	170.00	172.00	169.00	77.00	117.00
38 1/2	171.00	173.00	170.00	77.50	117.75
38 3/4	172.00	174.00	171.00	78.00	118.50
39	173.00	175.00	172.00	78.50	119.25
39 1/4	174.00	176.00	173.00	79.00	120.00
39 1/2	175.00	177.00	174.00	79.50	120.75
39 3/4	176.00	178.00	175.00	80.00	121.50
40	177.00	179.00	176.00	80.50	122.25
40 1/4	178.00	180.00	177.00	81.00	123.00
40 1/2	179.00	181.00	178.00	81.50	123.75
40 3/4	180.00	182.00	179.00	82.00	124.50
41	181.00	183.00	180.00	82.50	125.25
41 1/4	182.00	184.00	181.00	83.00	126.00
41 1/2	183.00	185.00	182.00	83.50	126.75
41 3/4	184.00	186.00	183.00	84.00	127.50
42	185.00	187.00	184.00	84.50	128.25
42 1/4	186.00	188.00	185.00	85.00	129.00
42 1/2	187.00	189.00	186.00	85.50	129.75
42 3/4	188.00	190.00	187.00	86.00	130.50
43	189.00	191.00	188.00	86.50	131.25
43 1/4	190.00	192.00	189.00	87.00	132.00

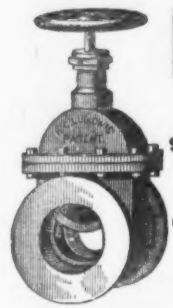
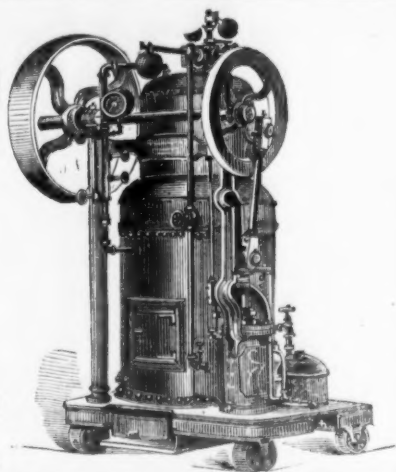
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\$200.00.Cheaper than any Engine offered of
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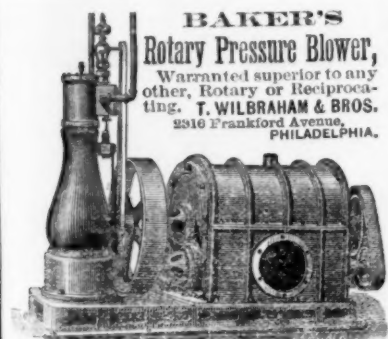
This Trap automatically drains the water of
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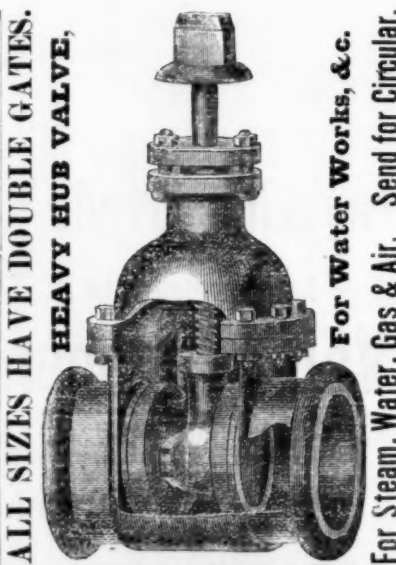
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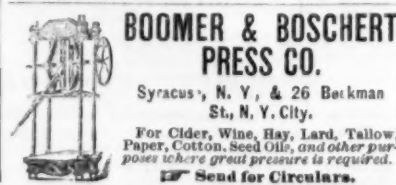
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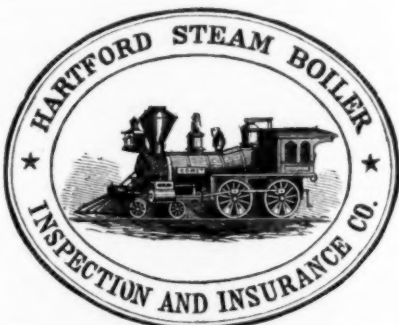
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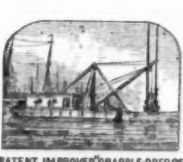
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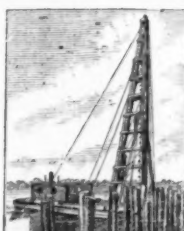
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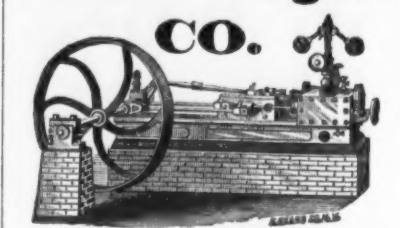
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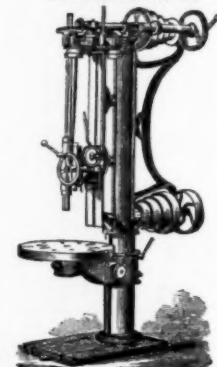
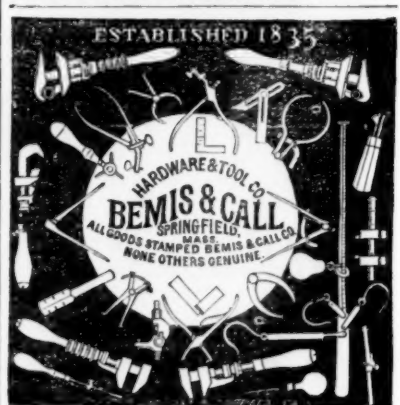
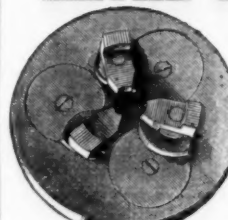
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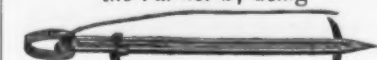
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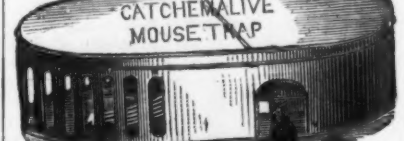
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Each pencil is seven inches in length, making 2,352,000 feet, or 445 miles, of pencils placed end to end!

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